

AVIATION WEEK

A MCGRAW-HILL
PUBLICATION

April 29, 1957

50 Cents

ICBM Threatens
To End Feasibility
Of "Open Skies"



McDonnell F-101B With Falcons

MATS Evaluates Turboprop Reliability

"Kaylock for shear nut height"

"Kaylock for the utmost in self-locking dependability"

"Kaylock for internal or external wrenching"

"Kaylock for tensile nut strength"

"Kaylock for extra high temperature"

"Kaylock for lightest weight"

"The next nut used here is a Kaylock Hex Nut which is also available in numerous standard sizes."

KAYLOCK® has become the Symbol of Leadership— All-metal self-locking nuts

based not only on past performance, but on advanced development that provides tomorrow's parts today.

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This One Kaylock Hex Nut meets the requirements of the New National Aircraft Standards: NAS 679 Low Height Nut, NAS 1021 Regular Height Nut, NAS 1022 Shear Nut, also approved for all three Air Force-Navy Standards: AN 363 High Temperature Nut, AN 364 Shear Nut, AN 365 Standard Hex Nut.

For more information, write for our catalog.



**A flick
of your finger gives you**

— foolproof
program check — fully automatic
output monitoring — pin-point
circuit analysis

Only the new GEDA Automatic Problem Analyzer completely checks computer programming and operation.

Here's one of the greatest advances in computer speed and reliability: It's the new GEDA Automatic Problem Analyzer — standard equipment at no extra cost on every GEDA A-14 Goodyear Electronic Differential Analyzer.

Here's how it works:

Switch the computer control to CALIBRATE. Then simply dial the "test" number of the first active channel in your problem. Push here on every existing output in the computer, whether linear or nonlinear, is scanned and its position and value indicated. Repeat the dialing process for each active channel in succession. Then, compare the output readings with your setup diagram. You know at once whether: (1) all connections are properly made; (2) assumed component values, (3) every register, multiplier, function generator, coefficient position, etc., used in the problem is operating properly; (4) every coefficient in the computer has been properly established; and (5) all initial conditions are present and correct.

But, that's not all. By adding only the optional GEDA Automatic Read-Out Printer, the entire operation becomes fully automatic — from start to finish — giving you a continuous printed record of every active channel, by number, plus the connection, magnitude, polarity and scale factor of every output — shared by channel. If an error exists, you know immediately where to find it on the problem board.

As of that wasn't enough, the GEDA A-14 scanner will also completely check every element in the computer for output drift and calibration adjustment. And, A-14 circuitry provides for automatic polarizer-center settings by the new "throughput" gun method.

The Automatic Problem Analyzer is but one of many advanced design and engineering features which make the GEDA A-14 Series the most accurate and flexible analog computer ever available. Get the complete GEDA A-14 story today. Write: Goodyear Aircraft Corporation, Dept. 581AB, Akron 15, Ohio.

P.S. For detailed information on the GEDA A-14 Automatic Problem Analyzer, ask for your personal copy of the technical paper, "A New Method of Verifying Analog Computer Problems and Performance."



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AIRCRAFT**

the world's largest manufacturing facilities for aircraft seating...for aircraft interior equipment

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More...yes. For also behind every Weber buffet are design responsiveness...weight-conscious engineering...efficient integrated facilities for quantity fabrication. Plus...the most reliable, longest established company in the field, daily adding its reputation on your flying reflections.

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AVIATION CALENDAR

- Apr. 24-May 2-10th Annual National Convention, Society of Aeronautical Weight Engineers, Rensselaer Hotel, Works.
- Apr. 28-May 10-19th Annual Meeting, Solid State Meeting, International Air Transport Assn., Tampa, December, Eng.
- Apr. 30-Electronics Meets the Helicopter 13 annual action meeting, New York Section, American Institute of Electrical Engineers, 51 W. 50th St., New York.
- May 13-Spring Meeting and Exhibit, Society for Experimental Stress Analysis, Hotel Sheraton Boston, Mass.
- May 23-Backward Moving, International Training Society, Madison Hotel Washington, D.C.
- May 28-1967 Convention American Association of Airport Executives, Sheraton Hilton Hotel, Houston, Tex.
- May 28-29th Annual Meeting Aero Medical Assn., Sheraton Hotel, Denver, Colo.
- May 29-Electrical Engineering Aspects of Aircraft and Missiles, American Institute of Electrical Engineers, Sheraton Hotel, Denver, Colo.
- May 29-Aircraft Electrical Equipment Conference, Hotel Sheraton Dayton, Ohio.
- May 29-Space Assembly, Radio Technical Committee for Aeronautics, Ambassador Hotel, Los Angeles, Calif.
- May 31-June 10th, Annual National Forum, American Helicopter Society, Sheraton Hotel, Washington, D.C.
- May 31-June 10th, American and Related Engineers and Their Applications, Western Union Auditorium, N.Y.C.
- May 18-19th National Conference on Aircraft Electrical Systems, sponsored by the Institute of Radio Engineers, Dayton, Ohio.
- May 31-June 10th, Operation & Maintenance Forum, sponsored by Pratt & Whitney Aircraft Division and Lockheed Pacific America Corp., Disneyland Hotel, Denver, Colo. Other sessions May 17 at (Continued on page 6)

AVIATION WEEK ■ APRIL 20, 1967

Vol. 46, No. 17

Aviation Week, 1967, is scheduled from April 20 to April 26, 1967, at the Sheraton Hotel, Denver, Colorado. The program is designed to provide a comprehensive overview of the state of the aviation industry, and to provide an opportunity for the exchange of ideas and information among industry leaders.

The program includes a series of seminars, workshops, and roundtable discussions, as well as a variety of social and entertainment activities. The seminars will cover a wide range of topics, including aircraft design, manufacturing, operations, and maintenance.

The workshops will provide an opportunity for participants to work on specific problems and to share their experiences and solutions. The roundtable discussions will provide a forum for participants to discuss current issues and to share their views on the future of the industry.

The social and entertainment activities will provide a chance for participants to relax and to enjoy each other's company. The program is designed to be both informative and enjoyable, and to provide a valuable opportunity for participants to learn from each other and to build lasting relationships.

Participants are invited to bring with them a variety of materials, including brochures, reports, and other documents, which will be made available to all participants. The program is open to all who are interested in the aviation industry, and to all who wish to learn more about the latest developments in the field.

For more information, please contact the Aviation Week Secretariat, c/o Sheraton Hotel, Denver, Colorado. The Secretariat will be happy to provide you with a detailed program of events, and to answer any questions you may have.

Registration fees are \$100 for individuals and \$200 for corporations. The fee includes a full breakfast, a luncheon, and a dinner. The fee also includes a copy of the program, and a copy of the proceedings. The fee is payable in advance, and is non-refundable.

Reservations should be made as soon as possible, as space is limited. The deadline for reservations is April 10, 1967. For more information, please contact the Aviation Week Secretariat, c/o Sheraton Hotel, Denver, Colorado.

Program, Plans and How To Register, is available from the Aviation Week Secretariat, c/o Sheraton Hotel, Denver, Colorado.

TAMING A "MONSTER" IN CAST STEEL



WITH LEBANON'S CERAMICAST PROCESS

THIS FLOW DIVIDER AND FUEL SELECTOR FOR A JET ENGINE was called the "monster" by its designers at the Cleveland Division of Parker Aircraft Company. Why? Because the dimensional requirements of its inner passages called for the most extreme quality control in the casting process.

Foundry engineers at Lebanon met the challenge, and selected the CERAMICAST Process as best suited because of the need for close tolerances, extreme smoothness in the internal passages, and the intricate design.

During several months of development work, Lebanon engineered a special casting material to meet these requirements and developed special means for setting and holding the cores to meet the dimensional tolerances. Now in quantity production at Lebanon, this superb casting meets Class 1 3-day inspection and operation under service conditions of high pressure and elevated temperatures.

LET US TAME YOUR "MONSTER" if your design project utilizes cast steel and requires a high degree of internal casting quality together with surface smoothness, close tolerances, and dimensional accuracy. CERAMICAST may provide definite quality and cost advantages. Let our engineers discuss the process with you and its applicability to your project. Write for CERAMICAST literature.

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LEBANON STEEL FOUNDRY

LEBANON STREET HANOVER, PENNSYLVANIA
CARBON, LOW ALLOY AND STAINLESS STEEL CASTINGS



Another famous plane

PROVEN IN SERVICE

1942
Editor: Herb Andrews
 8:20 (October) Along the
 horizon the Japanese home
 land — also the home
 cities including Tokyo

During the first morning days of 1942 the dependence of 20 was
 growing full in service and even then, 15 today that years
 ago. Rockbestos high temperature wire was well known to the
 aviation industry — and it is still a proven in use as a replacement.
 Using an important part of the aviation industry, Rockbestos has
 commonly provided high temperature wire which meets the exacting
 standards of modern aviation — both military and civil.

Rockbestos will continue to develop wires to meet the needs of
 industry needs and just how Rockbestos can help solve your
 high temperature wiring problems. Write for more or plans for complete
 specifications and application information.

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 ST. LOUIS • LOS ANGELES • PHOENIX • DALLAS • SEATTLE

AVIATION CALENDAR

(Continued from page 5)
 April 20—Aviation Hotel, Burbank, Calif., May
 20 at Hotel Glendale, Oakland, Calif.
 May 11—May 22, New Washington Hotel,
 Seattle, Wash.
 May 15-17—Int. Aero. Assoc. Conference,
 for Transport Division, American Society
 of Civil Engineers, Park Sheraton Hotel,
 New York.
 May 18—North Annual Aviation Fair Safety
 Seminar, National Fire Protection Assn.,
 Hotel New York, Los Angeles, Calif.
 May 24-June 2—23rd Pan Am Show Society
 of French Aircraft Constructors,
 Le Bourget Airport, Paris.
 May 25-June 2—North American Club
 Meet, sponsored by Boeing Aircraft of
 Dallas, Com Modesto Airport, Dallas,
 Texas.
 June 1—12th Annual Maintenance and
 Operations Meeting for Airlines and Ex-
 cessive Aircraft Owners, sponsored by
 Boeing Aircraft Service, Boeing Air-
 craft Support Co.
 June 15—15th Annual National Aviation
 Trade Show, Massachusetts County (N. Y.)
 Airport.
 June 15—15th General Aviation Luncheon
 Luncheon, Wichita University, Kans.
 June 16—National Symposium on (Haw-
 aian) Engineering Technology, Wilkes
 Hotel, Washington, D. C.
 June 18—Tribute Personal Remembrance
 Symposium, in cooperation with National
 Technical Center Conference, Sheraton
 Hotel, Chicago, Ill.
 June 18-19—Lullian Series on Various Ma-
 aine, sponsored by New York State Uni-
 versity College of Engineering, Albany.
 June 19—20th Annual Flight Meet-
 ings & Engineering Conference, Civil
 Engineers, San Francisco, Calif.
 June 19—Plenary for Plenary, New Eng-
 land Section, Society of Plenary Engi-
 neers, Lowell Technological Institute,
 Lowell, Mass.
 June 27-28—National Convention on Mi-
 crofilm, Sheraton Park Hotel,
 Washington.
 June 27-28—National Summer Meeting, in
 honor of the Anniversary, Sheraton,
 Hotel, Los Angeles, Calif.
 June 28-29-30—Annual Meeting, Aviation
 Conference & Manufacturers, The
 Sheraton, Colorado Springs, Colo.
 June 29—South National Aviation Dis-
 cussion.
 July 11-12—British Larkland International
 Aviation Competition, the National Air
 Race (first round) and the King's Cup
 Air Race, Cranwell Civil Aerodrome,
 Grantham, England.
 July 20-21—Western Electronic Show &
 Convention, Cox Palace, San Francisco,
 Calif.
 Sept. 16—South International Aeronautical
 Conference, Hotel Normandie, Bordeaux
 and Institute of the Aeronautical Sciences,
 Philadelphia and London, England.
 Sept. 24—1947 Flying Display, Society of
 British Aircraft Constructors, Farnborough,
 England.
 Nov. 18—Washington State Management
 Meeting, Sheraton Hotel, Dallas.

THE INFORMATION ON THIS PAGE IS TYPICAL OF THE DATA YOU WILL FIND IN THE NEW AIRBORNE CATALOG

350 LB. LINEAR ACTUATOR

ONE OF OUR NEW SERIES OF
 HIGH PERFORMANCE ACTUATORS

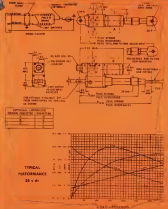
wt. 0.97 lb.
 L12 MODEL



GENERAL

ENGINEERING DATA:

- 20 mil. dc split field, series wound
 magnet, universal duty motor
 with magnetic brake. Available
 with thermal overload protector.
- Direct indicator limit switches ex-
 ternally adjustable through rubber
 length of stroke, positive overtravel
 stop, overload clutch, and re-
 traction device.
- Maximum operating load—350 lb.
 ultimate static load—1000 lb. for
 12 inches minimum extended
 length.
- Weight 0.97 lb.
 Plus 0.03 lb. x stroke in inches.
 Plus 0.21 lb. for thermal overload
 protector.
- Maximum dimensional tolerance
 ±.005 in., unless otherwise specified.
- Dimensional space and maximum
 lengths for core stroke. To deter-
 mine maximum length for required
 stroke, add stroke plus stroke
 overtravel plus total end fitting
 adjustment.



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NEW AIRBORNE CATALOG
 Contains full description of the Airborne
 line of electro-mechanical catalog, all
 products and accessories. Write for it
 for the page 10.



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... and Burroughs ground and airborne computers do the job

No matter how awesome the speed of today's ballistic missiles, the electronic computers that guide them must "think" far ahead of that speed to keep them unerringly on target.

This sort of instantaneous computation is a Burroughs specialty — which is why ours is the major response bid for the research and development of a guidance phase of the U.S. Air Force Ballistic Missile program to program embracing ATLAS, TITAN and THOR.

We have the proved resources and capabilities for further research and development all even more advanced ground and airborne computers. And as to reliability—Burroughs has unobtainably delivered an every defense contract undertaken. Not only in electronic computers, but in control systems, instrumentation, communications data processing and others.

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GROWTH IN OPPORTUNITIES



At Temco GROWTH tells the story

Growth — in engineering opportunities, for example, tells the Temco success story.

Even in the fast-moving aircraft industry, Temco's growth has been extraordinary. Its rise — from small manufacturer to designer and builder of its own aircraft — has been accelerated by constant discovery and development of new opportunities.

And engineering opportunities have multiplied with every step of the growth. In 11 years, the Temco Engineering Department has grown from a staff of 4 to more than 800. To its earlier production engineering skills, Temco has added such diversified specialties as electronics, guidance systems, and its own jet aircraft, transfer and rescue systems.

Month by month, new activities at Temco create new opportunities in research, design and development. The story of vigorous growth at Temco carries a special message to the experienced engineer: here is your opportunity to make ahead with a company that's going places fast!

Mr. Joe Russell, Engineering Personnel
Room 165-H, Temco Aircraft Corp., Dallas, Texas
Please send me complete details of the Temco story of career opportunities for experienced engineers. I am especially interested in _____

NAME _____
ADDRESS _____
CITY _____ STATE _____



AIRCRAFT CORPORATION, DALLAS

IN ENGINEERING THE BEST OPPORTUNITIES ARE IN AVIATION • IN AVIATION THE BEST OPPORTUNITIES ARE AT TEMCO

The skies are full of J-M Clipper Seals

Protecting bearings in many types of aviation mechanisms

Johns-Manville's precision-molded Clipper Oil Seals retain lubricant and exclude dirt. These seals have a dense asbestos-impregnated heel and a soft flexible lip concentrically molded into one unit. This unique construction provides maximum sealability, low torque, easy installation, long life and wide adaptability. Some of their applications include:

In Actuators—In the worst gear drives of hydraulic actuators, Clipper Seals prevent oil leakage at shaft speeds of 0 to 3000 RPM, pressures of 0 to 20 psi and temperatures of -60 F to 250 F... with a maximum seal drag of 4 oz. Sketch shows seal used in tandem with specially developed metal clipper ring. Here, Clipper seals replaced a far more costly and maintained high performance.

In Constant Speed Propellers

Used on the blade retaining nut of constant speed propellers, J-M Clipper Seals maintain a tight seal against the 400 psi pressure created by the propeller's velocity. Clipper Seals' tight shaft drag permits rapid pitch changes. Clipper Seals have also provided satisfactory service in both the major surfaces in auxiliary drive gear trains.

In Crankshaft Assemblies

Johns-Manville developed a special split seal to permit use of an economical finger-type seal which in a popular engine used in small planes.

In Bearing Mechanisms—High sealability and low friction at high shaft speeds make Clipper Seals particularly suitable for chet and in numerous bearing mechanisms in helicopter rotors.

If you have an oil seal problem, Johns-Manville will be glad to help you solve it. For engineering help and free 56-page illustrated brochure PK-7LA, write Johns-Manville, Box 14, New York 16, N. Y. In Canada, Port Credit, Ontario.



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American Airlines has used the Bendix Ignition Analyzer for quite some time. The decision to prepare the entire fleet of aircraft for use with this analyzer was made after long usage had shown this to be the most valuable equipment for American's requirements.

Major airlines, military services, and corporate aircraft operators have found the Bendix Ignition Analyzer to be a vital and almost indispensable piece of equipment to reduce costs

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The Bendix Ignition Analyzer is a sound investment that will pay for itself within a short period. We would be pleased to provide complete information as to the most convenient and economical analyzer installation for your aircraft.

Circle 10



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Scintilla Division
BENTON, NEW YORK





...By Jove!

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Just choose the Electro-Snap Basic Switch that meets your electrical requirements, add the proper actuator — and power! — you have a tailor-made precision switch that exactly fits your application. Electro-Snap makes a wide variety of snap switches to fit almost any requirement. And our engineering department is at your service if a standard combination "won't fit the bill."

For prompt action on your switching problem, send us a brief description and rough sketch of the switch you need.

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SUB-MINATURE SWITCHES TYPE S-6

1 P.O.E., 1 circuit, 5 amps, 125/250 v AC
Operating force
1/16 grams max.
Environmentally
resistant mechanism
Special sealed EN-P
is standard for
-65° to +100°
F operation.
Write for
data sheet SM-12



TYPE S SWITCHES Series S1



1 P.O.E., 2 circuit, 10 amps, 125/250 v AC, 70° to 90° Ind. Switch
as solder terminals on ends or one side of switch. Also available with reset button at bottom of switch or in Type S-100 Make-Before-Break Series where contact completes a new circuit before interrupting old one.
Write for
data sheet SM-12



Write for
data sheet SM-12

DOUBLE-POLE SIMULTANEOUS ACTION TYPE D-8

8 P.O.E., 4 circuit
10 amps, 125/250 v AC
10 amps, 90° to 90° Ind. Switch
Right terminals and line separate circuit which operates simultaneously parallel switch to carry 3-phase motor, applied negative voltage, etc.



HERMETICALLY-SEALED DOUBLE-POLE SWITCH Write for data sheet HM-22



P.O.E., 4 circuit 10 amps, 125/250 v AC/90° to 90°

ELECTRO-SNAP SWITCH & MFG. CO., 4122 West Lake Street, Chicago 24, Illinois
MANUFACTURERS OF A COMPLETE LINE OF PRECISION SWITCHES FOR INDUSTRY AND AVIATION



Typical "low head" installation of Lead Tube-Pump Assembly



It is only natural that Lord should produce the major contribution to the efficiency and performance of helicopters. Lord manufacturing has 30 years' experience in engineering bonded rubber solutions for aircraft vibration problems. Most modern aircraft today rely on Lord mountings for increased passenger safety and comfort. Consult with Lord—the leader in engineered vibration control.

"Air issue"—Bell 47-J (left), Hiller 13-C (right)—assure the growing problem of transporting passengers from city to airport and add local Mustangs to aerial schedules.

[illegible]

ALLIANCE, 10/10/04. Winner this
election, 1994. Winner 1998.
CHICAGO, IL. Winner 1994.
CLEVELAND, OH. Winner 1-2
times, 1994. Winner 1-2
times, 1998. Winner 1-2

BARBER, C. 1988. Michigan 1977
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 Herbarium, Ann Arbor, Michigan. 1977
 collected at the University of Michigan
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WHEN YOU "MAG-CHECK" THE BANKS, YOU CAN BANK ON MAINTAINING R.P.M.!

You're on the runway . . . all set for take-off . . . it's time for "MAG-CHECK"! When you switch from "BOTH" to "1" to "2" to "3" to "4" as you go, there's merely a momentary drop with AC-283 Fine Wire Aircraft Spark Plugs. There's no need at all of a steady light delay to pull back on the throttle for the ACs are functioning perfectly!

AC-283s have platinum electrodes for the very finest anti-fouling characteristics. They provide smoother idling and higher heat conduction—prevent pre-ignition and ice buildup, and they're less susceptible to hard fouling.

AC Aircraft Spark Plugs have been proved in millions of hours of flight in military and civilian planes. You'll find them best for the planes you fly!

AC-283 PLUG  THE GOVERNMENT CHOICE OF GENERAL AIRCRAFT



ELIMINATION OF BEARS, cooling devices and other components gives the new G-E and Electro-venter turbine engine systems reduced weight, size, and complexity.



COMPLETELY SELF-CONTAINED, G-E turbo-pump systems can be located wherever hydraulic power is needed, permitting also the integration into the base aircraft.

New Hydraulic Power System Saves Space Operates on Demand for Fuel Savings

On the conventional engine-driven hydraulic pumps which require extensive provision of vital components, the G-E turbopump is a complete hydraulic power system containing a power turbine, hydraulic pump, pressure relief, reservoir, filter, cooler and, electrically-actuated and weight save made possible by a direct drive feature which eliminates speed-reducing components in the 8 gpm, 3000 psi turbopump system.

When not load demand exists, the turbo pump automatically shuts down. This "on demand" feature eliminates the constant by-pass operation of a conventional operating pump and associated fuel consumption needed to provide by-

pass power increased unit life allows more hours between overhaul.

Greater safety is provided by automatic overspeed control and an advanced turbine wheel design. Titanium turbine buckets, weighing only three hundredths of an ounce, are pinned to the turbine disk by a single shear pin. If forced to run overspeed, the pin will shear before break speed of the turbine disk is reached and the buckets will be contained within the turbine exhaust nozzle.

The turbopump system's fixed recuperator casing acts as a heat exchanger, eliminating supplementary cooling devices. Integral recuperator construction

helps protect against handling shocks, and minimizes the possibility of leaks.

For additional information, call your G-E Aviation and Defense Division Sales Office or read the stories below. Aircraft Division, P.O. Box 100, General Electric Company, Lynn, Mass.

General Electric Company
Section 4337-15
September 4, 1964

Please send me SAEs 4337-15, including detailed information on the New Lightweight Hydraulic Turbopump.

☐ Immediate project ☐ Reference only

Name _____

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Company _____

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is always recognized

*Discovered (Dinner Theater)
by Myron, Green, Fifth Century
in National Museum, Rome*

CREATIVE LEADERSHIP is the ability to originate a new beauty, new quality... or new capability. Numerous examples of Summers Design Originality, giving new standards of performance, are to be found in today's Aircraft Guidance Instruments. For Leadership, for "creative craftsmanship," be Guided by Summers.

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Indicator; Horizontal Speed Indicator (HSI); Remote Directional Gyr Indicator; Lateral Control; and Spin Recovery Indicator (SPI)



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APRIL 22, 1957

AVIATION WEEK

VOL. 44, NO. 17

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European Office—1 rue Du Temple, Geneva, Switzerland

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Blind Flying Unit Devised for Helicopter 26

• Bell and Bendix develop instruments to permit blind flights from takeoff to landing in remote areas.

Curtis Details Traffic Control Program 38

• Three-phase plan designed to increase capacity, decrease still-site board 10-fold by 1975.

Air Force Tests Turboprop Reliability 50

• Reengineered Boeing KC-97, Convair C-131 and Lockheed C-130 are flown by MATS in evaluation.

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COVER: McDonnell F-101B two-seat all-weather version of the Phantom has made its first flight (AV April 13 p. 12). Additional USAF orders have been received for the airplane, which is powered by Pratt & Whitney J77 engines. Three Hughes Falcon air-to-air missiles are being mounted on the interceptors, designed for high rate-of-climb and extreme altitude performance.

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WHO'S WHERE

In the Front Office

James L. Lewis, president, and Paul C. Eberhardt, vice president, Lockheed Corp. of America, Marietta, N. J.

Ralph J. Olson, executive vice president, Lockheed Aircraft Service, Orlando, Calif.

Norman B. Gibbs, vice president and managing director, Lockheed, Inc.

Charles C. Ross, vice president and general manager, General Electric Corp., Avon, Conn.

Also Robert B. Young, vice president, General Electric's Liquid Rocket Plant, Avon, Conn.

W. E. Newbery, vice president and general manager, Delco Chemical Industries, Inc., Detroit, Mich.

David D. Minto, assistant general manager, Lark Aviation, Inc., Binghamton, N. Y.

Mr. Minto continues as a vice president.

Honors and Elections

Distinguished Civilian Service Awards have been presented to Dr. Wernher von Braun, Otto Wulfsberg, Robert E. Mehl and Dr. John Koster. The award was presented to Dr. von Braun, director, Development Operations Division of the Army Ballistic Missile Agency, Huntsville, Ala., for "exceptional contributions to the defense of the U.S. as chief of the Guided Missile Division of Rocket Research."

to Mr. Wulfsberg, a physicist with USAF's Air Research and Development Command, Wright-Patterson AFB, Ind., for "extraordinary initiative, imagination and ability in studying and solving important problems of advanced aerodynamics." To Mr. Mehl, deputy director of operations, Development, Air Research and Development Command, Brooks AFB, Tex., for "his outstanding scientific achievements in connection with the development of the rocket and electronic equipment now used in the Navy's Airborne Early Warning Control Information Center airplane, the WV-1."

to Dr. Koster, chief scientist, Naval Air Development Center, Orlando, Fla., for "his outstanding scientific achievements in connection with the development of the radar and electronic equipment now used in the Navy's Airborne Early Warning Control Information Center airplane, the WV-1."

Changes

Philip D. Terry, chief engineering and design, W. A. E. Whitaker Co., Ltd., Los Angeles, Calif.

Charles E. McGee, night manager, Conover Division, General Dynamics Corp., San Diego, Calif.

General Electric Company's Missile and Ordnance Systems Dept., Philadelphia, Pa., has named a team for the management of various missile research programs.

Research Laboratory, Dr. Joseph Fisher, manager-engineering, Dr. Bernard Lester, manager preliminary design, Mr. A. L. Lofgren, manager administration, Dr. E. A. Lofgren, executive representative research laboratory, Lockheed Aircraft Service, Orlando, Fla.

Charles E. McGee, night manager, Conover Division, General Dynamics Corp., San Diego, Calif.

Dr. E. A. Lofgren, executive representative research laboratory, Lockheed Aircraft Service, Orlando, Fla.

Dr. E. A. Lofgren, executive representative research laboratory, Lockheed Aircraft Service, Orlando, Fla.

Dr. E. A. Lofgren, executive representative research laboratory, Lockheed Aircraft Service, Orlando, Fla.

INDUSTRY OBSERVER

► Radically new type of gyroscope which uses spinning planes of electrons or other newly discovered atomic phenomena in objective of explosive development program to be launched by Rand Air Development Center. If successful, the new atomic gyro might permit major improvement in the accuracy of inertial guidance system and would be the first radical change in the gyro since it was invented nearly 50 years ago.

► Two General Electric F-105s are now being flight tested at Edwards AFB, Calif. First model to be built with production tooling is scheduled to be rolled out at General's San Diego plant in July.

► USAF's Lockheed F-104A Starfighter will be fitted with Navy's air-to-air Sidewinder missile for long trials of this unorthodox combination at the Naval Ordnance Test Station, China Lake, Calif., where the missile was developed.

► Liquid propellant booster unit for North American Navaho intercontinental guided missile has developed 405,000 lb. thrust during 45-sec. test stand firing.

► Guidance packages for Martin Titan intercontinental ballistic missile and Douglas Thor intermediate range ballistic missile are being tested for acceleration and vibration trials at the Supreme Naval Ordnance Research Task, China Lake, Calif.

► Bell Helicopters Corp. is developing a helicopter simulator for the Office of Naval Research. Simulator will be used to test psychological and physiological reactions of pilots to various types of instrument displays.

► Thrust reverser proposal for the C-140B, converted version of General Electric's T-70 turbojet, incorporates cascade vane arrangement through which exhaust is diverted by closing of internal channels. Powerplant with reverser will measure approximately 114 ft in overall length.

► Allison Division of General Motors Corp. and the General Electric Co. are conducting preliminary work on chemical fuel engines of the type that would power a chemical fuel bomber. One of the two companies is expected to receive a USAF development contract.

► Navy's XKDR-1 rocket-powered target drone developed by Kodakplane is undergoing captive firing trials on aircraft carrier guidance system in development flight test at Naval Air Missile Test Center, Point Mugu, Calif.

► Preliminary design studies on a 230 hp. free shaft turbine engine have been completed for U. S. Army by four manufacturers. Proposals are being selected from Lycoming, Turbochem and the Turbo Research Division of Studebaker-Packard and Continental. Concurrent light plane modifications are reportedly watching the development for possible application in that field.

► Martin's Bellhop test vehicle is basically a 250 lb. loads with booster and control. Two triangular control surface sections are positioned at the base of the nose finings; four fixed stabilizing fins in the form of truncated triangles are at rear. Finings on top and bottom of booster missile cover fins used in tracking.

► Multiple rotor designs for helicopters are receiving increasing attention from major manufacturers. U. S. Army is encouraging them to study the idea over a wide range of aircraft sizes. Convair-Turbo-prop, Inc., Auroraville, Iowa, Ind., is a pioneer in this area, but a contract for work on a four-rotor design.

► U. S. Army has returned to fundamentals in its work on aircraft suitable to operate off rough terrain. Bell Helicopters is working on an exact definition of "rough terrain" for use in specifications. Fairchild has a contract for work on an improved landing gear design that will meet the new and exact specifications.

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ASHLAND, MASS. — Every time a Fenwal Unit Fire and Over-Heat Detector gives an alarm, a temperature danger point has been reached that is very instant. The unit will not, if properly installed, sound false alarms with false alarms.

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They are designed specifically for aircraft, are both light and compact. Roughly, they are slightly larger than a flashlight pen, and the heaviest of them weighs only 2.50 ounces. They are generally equipped with a transformer mounting flange, calling for three holes in a 1.31-inch-diameter bolt circle.

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...WHERE THE FUTURE IS MEASURED IN LIGHT YEARS

Trouble at Patrick?

Increasing reports of destruction with operations of Patrick AFB Missile Test Center, was the latest that of Defense Secretary Charles E. Wilson in first last week end. These reports that several contractors are unhappy with the administration of Patrick facilities with long delays that so up high-speed personnel and equipment and with serious critics for one of the firing pads by competing companies, agencies and military services. Wilson was to attend his inspection in connection with "test work" but he also wants to see what the progress is and just exactly where we are. When she is known to be disturbed by news "leaks" from Patrick.

Most recent one, second USAF Thor intermediate range ballistic missile was fired last week, but was defective and had to be destroyed on the air. It was a prelude to the test with the deeper ICBM. Neither weapon has had a really successful flight.

Airway Charges

President Eisenhower has told Congress that an important step toward reducing federal expenditures would be the imposition of user charges on the federal airways. This, he says, "will relieve the general public of having to subsidize governmental services afflicting special interests."

Introducing his proposals for budget-cutting in line with the current trend, the President said:

"I am sure most members of the Congress are as gratified as I am to note the growing awareness of private citizens that the dollars spent by the federal government are in fact their own dollars, and that federal benefits are not free."

The President also urged:

- Increase in postal rates. Congress, however, is unresponsive to the administration's plan for an increase in the annual rate from 45 to 50 cents on domestic and other services.
- \$250 million reduction in military public works construction for Fiscal 1958. The President recommended \$2.1 billion in January.

In Congress

House Appropriations Committee members will begin the major, and controversial, task of trimming the Fiscal 1958 defense budget this week. Executive sessions with Department of Defense witnesses should have been completed.

It is a "bet" that the \$18 billion defense support of the Administration will be reduced. Ray George Mikes (D Tex.), chairman of the Appropriations Subcommittee on the Armed Services, reports "but very few men divide lines and where." They will take several weeks. Mikes estimates the bill will be ready for debate on the House floor May 20.

Other developments to watch for:

- Hearings on the long-pending Northwest Airlines strike case will open May 1 before the Senate Permanent Subcommittee. The allegations is that because of a "cut" from the Civil Aeronautics Board there was speculation in the stock market after the ending of a New York Times article in the current.
- House Commerce Committee will hold a hearing on May 3 on pending permanent certificates to U.S. Alaska

airlines. These are Northwest Airlines, Pacific Northern Airlines and Alaska Airlines. The most point of controversy is whether Northwest should be permanently eliminated on its Minneapolis-Alaska segment.

• Action by the House Commerce Committee on civil aviation will be scheduled for several weeks while the group takes up legislation to rule out federal control of independent oilfield gas pipelines. The legislation, upon used by the Commerce Committee chairman, Ray Cline (D Ark.) was voted last year by the President. It has been pending on the committee's desk.

• Senate Commerce Committee's Airline Subcommittee, headed by Sen. Mike Mansfield (D Mont.), will hold hearings on the proposed Presidential Assistant Edward F. Connelley as an Airline Modernization Board (AWA) Apr. 15, p. 25-26 with other Gary subcommittee has broader plans for a reorganization of the structure of the Civil Aeronautics Administration and Civil Aeronautics Board. Both proposals probably will be bogged down by controversy in the subcommittee.

Budget Cuts and Air Safety

U.S. Weather Bureau is publicly protesting the cut-back on its Fiscal 1958 budget in the House of Representatives. It describes the cut as a serious threat to air safety. The House reduced the agency's allocation from the \$40 million requested by 32 million. However, the \$35 million allowed is still \$100,000 more than the bureau's Fiscal 1957 budget.

If the House reduction stands, the Weather Bureau says it will not be able to:

- Implement "an improved system of in-flight weather safety service to both civil and military aircraft."
- Provide accurate forecasting and flight weather service for transoceanic flights for civil and U.S. aircraft.
- Prepare for the range wind and temperature forecasts that are essential for the safety and efficiency of jet operations at 25,000 to 30,000 ft. flight levels. Currently, these flight data are forecast only up to 35,000 ft.
- Allow installation of end-of-runway "bad weather" equipment.

Flying Time Cut

USAF's badly delayed maintenance and operations pricebook has forced an early and drastic cut in the flying time designed to maintain pilot proficiency. Pilots who are supposed to get 20 hours a month now are restricted only 10. General Eisenhower was put in effect early this month, about three months before the end of the fiscal year. Reason for early and substantial reduction is the unexpected drop in maintenance and operations funds that resulted from the Middle East crisis and European unity. Pilots want proficiency will drop, accident rates will increase. Technical Air Command also is reported chief of association for training purposes.

Private Defense

A comprehensive defense of U.S. general aviation is distinguished from civilian and military aviation—has been termed ever in Edward F. Connelley, President Eisenhower's special assistant for military facilities planning by the General Aviation Facilities Planning Group. The group was specifically organized to put part in a civilian's position before Congress.

—Washington staff

Blind Flying Unit Devised for Helicopter

Bell and Bendix develop instruments that permit blind flights from takeoff to landing in remote areas.

By Craig Lewis

P. Wachs—Capability of complete autonomous operation for helicopter in remote areas has been developed by Bell Helicopter Corp. and Bendix Aviation Corp.

The first Bell Bendix program has produced a set of instruments built around the Decca navigation system which permits helicopter to make complete blind flights from takeoff to landing in remote areas without ground instrument aids.

The new system was developed as a prototype program at Bell's Ft. Worth plant aimed toward giving the helicopter a functioning instrument system with available equipment.

It provides an immediate capability for blind flying, while other programs are still being developed to supplement current systems for future use.

Skunko Aircraft Division of United Aircraft as cooperation with several electronic manufacturers, also has developed instrumentation designed to provide a helicopter with all-weather capability. The instruments have been installed in an F105 and are undergoing tests at the Naval Air Test Center, Patuxent River, Md.

Bell and Bendix have brought the program to present operable, but still rudimentary, state entirely with their own money and effort. They are now trying to interest military and civil aviation agencies in supporting further development of the system.

Blind Landing Capability

The Bell Bendix instrument system is built around the Decca system, an autonomous aid that has been operating since then 18 years and is currently used in Europe. Key to the use applicants is the fact that it is especially for blind landings has been developed to fit with the small Decca navigation function.

With the new system a helicopter can itself on instruments, fly a pre-planned track blind from takeoff to landing, stop and make an ILS type approach and land using the aid of ILS, GCA or air traffic ground equipment at the landing point.

The development program was begun when Bell engineers became concerned that the lack of effort toward making available but non-standard equipment to improve helicopter instrument capability.

At this point, Bell discovered that

Bendix was looking for an opportunity to establish a commercial Decca chain for documentation and research. Bendix has U.S. aviation rights to build and sell the British Decca system.

A program was established to investigate the Decca system capability and to use the system as helicopter instrument research. Along with Decca, Bendix will use its own available instruments that were included in the test program.

The Decca system was modified into 40 miles with the center station 10 miles southwest of Bell plant. One slave station is 67 miles south and the other six stations 13 miles southwest of the plant.

Beta for navigation with the Decca is a picture of heliopic position lines generated by the relationship of transmission time, carrier and slave station. Intersections of position lines are used to give time, and position information is displayed by indicators or on a light display in the cockpit.

Available to other contract requirements from helicopter users, the program engineers decided to test these methods for evaluation of equipment.

- **Base unit on landing equipment** would be complete, "black bubble" operation—without instrument flight from takeoff to touchdown.
- **Upgraded remote landing areas** with no ground aids would be used.
- **Operations** would be conducted under instrument conditions for the need for absolute information.

First flight tests demonstrated satisfactory

ability of a helicopter with absolute attitude position acquisition and improved attitude information. The latter part of the test showed that the Decca system had information to offer in addition to accurate position and track data.

The test also showed that helicopter pilots need some assistance on ground speed, a more accurate attitude display, better displays to monitor and control displays in time. Two further needs were present landing spot location and a remote area instrument landing system.

Leading Display

With the Decca system, a helicopter could make instrument take off, climb onto navigational procedures and approach. To complete the cycle, a set of instruments was needed to give landing capability. These displays were developed to supply needed information to the pilot.

- **Remote transmitter indicators** ground speed with a grid of vertical and horizontal lines which can be referred to a fixed aircraft speed and direction and rate of rotation relative to the ground.
- **Course pointer indicator** serves as a remote area ILS, indicator approach along line of constant Decca phase angle.

This display also shows position of the helicopter relative to the present landing spot when it is below 10 ft altitude indicator color and shows position relative to desired track between two to three in the station.

- **Resource target** attitude and instrument with variable sensitivity to provide more accurate attitude position information.

A key instrument in the system is the basic attitude sensor, it provides accurate information during the landing phase.

The altimeter is only effective up to 100 ft, above ground level but is necessary to within 6 ft.

For navigation in flight, the Decca system provides a picture on which a map of the area can be placed. An indicator shows the position of the helicopter on the ground landing spot. The pilot also can navigate by reading separate data indicators which provide coordinates.

The Decca system will present a helicopter's position in its area with 20 ft accuracy. It will guide the helicopter to the planned landing spot, then, along with the basic altimeter, provide ILS approach information.

No provision is made for absolute timing equipment since the project engineers say there is no good substitute

among equipment now available for use. Ground altitude can be provided by reflecting them on the flight plotter's map.

Emphasis in the Bell-Bendix program has been on developing a system available immediately, and the Decca system was used because of its availability. A more advanced system could possibly be built around some other navigation system such as Cyclops, Loran, Radar or Doppler in the future. But Decca provides an accurate system right now.

The program has shown that a complete helicopter instrument system can be developed around the Decca system. It does not feel that the job is complete. Such refinements as improved cockpit display, possibly through the use of cathode ray tubes, are planned in the program.

Before the program goes any further, Bell and Bendix want a dozen additional test flights on the part of military to test helicopter systems. The two companies are not scheduled to go ahead with the program.

One feature of the Decca system that increases its military attractiveness is its stability. The system has been tested, a 1,000 ft, 100 knot turn is available. It can be transported in, set up and then be set up and operating in three hours. It has a range of approximately 115 miles under the worst conditions.

Bell is using two F1H helicopters in the program. Airborne Decca equipment weighs 40 lbs. The Decca slave altimeter adds another 16 lbs. Decca ground equipment weighs 20 units. It has an effective ILS range of 60 mi, range around the center station and an effective navigation range of 190 mi.

Army Asks for Design Of 2-Man Helicopter

New York—Six companies are working on designs for lightweight, simple, low-cost, two-man helicopters under study by the Army's Army Transportation Corps. The low-cost program are scheduled to terminate in August and involve dollar goals ranging from \$10,000 to \$100,000. The program is a study of a two-man helicopter, convert, basic-type helicopter for use operation in the 1960-1970 decade. The current competition is for submission of paperwork, including production cost estimates, and not actual designs, which eventually may develop into a design competition for orders for production.

Successful designs in the present studies are Bell, Dornier, Grumman, and Hughes, Bell and Hughes. Components are being encouraged by Army to cover all feasible approaches and considerable variety of designs are expected.

Newbury Retires After Six Weeks Under Fire in Defense R&E Post

By Claude Witte

Washington—Lt. Col. Newbury has resigned as Assistant Secretary of Defense for Research and Engineering six weeks after winning a low seat light to control the nation's military research and development activities.

Chosen in Newbury's short career in the war office appeared to be the department's most important officer of the Defense Science Board at a Pentagon meeting on April 4. The resignation was announced by Defense Secretary Charles E. Wilson last week days after an extensive account of the Defense Science Board meeting appeared in *Air Force Week* (April 15, p. 20).

In addition to the six of 18 of the country's top scientists, observers present said Newbury was looked for other scientific difficulties with the commission of Donald A. Quarles, now his post as Secretary of the Air Force, to a position as Wilson's top officer, the Defense Secretary of Defense.

Quarles and Newbury are considered entirely incompatible. Quarles is president of research and weapon development. Wilson's new Deputy Assistant Secretary is a scientist and research expert. His current work with Newbury, frequently in conflict, is in the area of research and development in the Department of Defense for Research and Development, and it is known that he has conducted the grant of more power to the Defense Science Board.

Wilson's official source for the Newbury resignation says that the veteran engineer originally came to the Pentagon with the idea of showing no months later that he was unable to be relieved of his assignment for some time. Wilson expects to find a successor within a month.

The Defense Secretary also said that the Defense Science Board will hold its regularly scheduled May 15 meeting which previously had been canceled. He said an agenda had been worked out in Newbury. Five days later, April 20, the meeting was unable to locate a Defense Science Board member who had received a letter to the session.

When a successor to Newbury is selected, it is believed that Quarles may play an important role in the choice. One thing is sure, however, that Quarles should have been chosen but that he is an individual with most degree of corporate mind, holdings before he can accept the job.

Following his resignation, Newbury told Pentagon public relations officials that he did not want to talk to the press. He had held a press conference two months earlier (AW April 1, p. 27) and had a reputation as the "most available" of the department's assistant secretaries.

The great misunderstanding was that Newbury was disappointed by the resignation of his position and attitude from scientific and military interests.

Despite Wilson's statement that Newbury had wanted to quit the same time as it is not clear that the engineers shared his Pentagon job and the capital atmosphere.

Defense research staff members were clearly relieved by Newbury's resignation. Fearing a general enlargement of scientific needs the Newbury regime, a self-education not considered necessary. Officers of private jobs in industry have been recruited for their staff employees in the past six weeks.

Newbury, who retired in a vice president of the Westinghouse Electric Corp. in 1946, had served that company for 15 years—most his graduation from Cornell University. As a mechanical engineer, he is a production expert on electrical equipment as well as an economist.

Turboprop Transport Planned by Fairchild

Hagerman, Md.—Fairchild Engine and Airplane Co. plans to build a prototype low-engine turboprop transport for possible military and civil use. "Turboprop" designed in a new line to Fairchild, C-119 and C-123 transport will be powered by Lycoming T55 engines and engine use of turbine body engine.

Proposed lightweight airplane will cost \$7,000 to \$10,000, carry a 2,500 lb. payload, 10,000 ft. climb and 21,490 ft. over an maximum 1,500 mi. range. Grossing speed of the transport will be 216 kt. and cockpit will be positioned for operation at altitudes up to 25,000 ft. Fairchild will place several takeoff distance of 2,240 ft. in 1,750 ft. the manufacturer said, and landing distance from 2,018 ft. to 1,610 ft. Fairchild said the airplane will be able to operate from rough terrain.

The 1,800 horsepower horsepower engine will be available in early 1958, Fairchild and "Turboprop" prototype is scheduled to be in mid-1958.

USAF Increases Order for B-58s, Explains Slower B-52 Production

By Evert Clark

Washington—Success of the Conquest B-58 development program thus far has led USAF to plan procurement of 18 more bombers during fiscal 1958 for a total of 21 and development also ended.

Progress on the B-58 program also is one of four reasons given by the Pentagon for delays in fielding the production run of the Boeing B-52 in the present 15 a month rather than increasing it to the previously announced goal of 20 (AW, Apr. 22, p. 34).

B-52 orders through fiscal 1957 are for 505 aircraft. Another 108 will be ordered in fiscal '58. Total cost for the 101 B-52s and 18 B-58s in the fiscal year will be \$999 million or 36-41% of the \$2,747 million which USAF will spend on the B-58s through 1958, it plans to say in fiscal '58.

Other Procurement

• **Bombing Bomber:** intercepter missile production order will be announced soon. Funds are included in the fiscal '58 budget.

• **Marine Mustangs, Fighters:** Falcen and Mustangs are not other orders to be placed in fiscal 1958. No production orders are contemplated for the North American Mustang before fiscal 1959.

• **WS-115A:** have changed bomber placed in a general follow-on for the B-52 is completed by Defense Secretary

Charles E. Wilson in "a development program in the exploration phase." The program is considered "very urgent" but Wilson also considers it "very important" to be sure that we get at essential people before we start spending big money on development Boeing and North American are in competition on the WS-115A.

• **Naval procurement:** in fiscal '58 will include North American F-100s, McDonnell F-101s, Convair F-102s and F-106s and Republic F-105s, but will not include Lockheed F-104s or North American F-105s.

• **Production schedule:** F-104s have been ordered in three separate fiscal years, including fiscal 1957. USAF plans F-104 wings for both the Air Defense Command and Tactical Air Command. Although none will be ordered in fiscal '58 under present plans, production contracted for earlier will start for some time, giving USAF an ample opportunity to order more before the production line closes down, if it decides that is necessary.

• **USAF's desire to increase B-52 wings from 11 to 15 is now being considered, but the decision will be made in connection with the fiscal 1959 budget.** Meanwhile, capacity to produce B-52s at 20 a month is being achieved, even though actual production will not reach that figure.

• **Holding B-52 production to 15 a month will cut cost out of the schedule.** Now will it change the total

No New Missile Plans

Washington—USAF does not now plan to provide funds for more large missile production programs. Current plan simply is that existing contracts should be completed and new ones will have to be issued, even though they may need more time to make them in production and that proof and even though some first order and high bay areas won't be filled.

Plans for new missile facilities over still have to be provided, and USAF procurement officials recognize that production area construction are not as close to being done as they should be, but there are "no need to build new missile plants just for space purposes."

whether to be provided in fiscal '58. Production of the total number would still stretch over a longer portion of the year.

• **Army's Redstone ballistic missile will be followed by a lighter, more mobile model.** Secretary Wilson's order that Army limit its missile range to 200 miles on combat still stands, but he said it is one of a number of questions that "we have to continuously look at... with no intent to changing circumstances and conditions."

Why No B-52 Increase

One official reason here has given for holding B-52 production at 15 a month, a fact which will be studied in May.

• **Progress on B-58 development:** USAF Secretary Donald A. Quarles and the program will be appearing on a high priority basis, says Secretary Wilson said. "The B-58 development now looks like it will be a successful development, and, in such, it will meet some production support, which it will get in due time."

• **Ability to obtain a larger number of an improved version of the B-52 by keeping the production rate lower.** Nature of the requirement has not been disclosed.

• **Revised intelligence estimates.** Apparently relating to re-evaluation of production rates of the Soviet Union and Base, Wilson said intelligence information which becomes available soon after the 30-a-month goal was set was a little different, and it looked like we had more time to do so orderly job. The goal of 20 was announced in the light of criticism from the Senate Airpower Subcommittee that Russia was outpacing the U.S. in bomber production.

• **But manufacturing schedule.** Although he would not say one word would be reduced, Wilson said "in many cases we get cheaper production by planning it out over a longer period of time and getting more expert people



Coanda Effect on P6M

New plans of Martin P6M SeaMaster accounts the high fineness ratio of its tail. Large horizontal tail finlet, and down wing leading pressure are also shown. Large open doors on the engine nacelles provide additional air drag, being to prevent engine overheating. Valuable results in water tests by jet blast on work of Coanda effect (AFM Oct. 31, 1955, p. 24), that jet blast tends to follow a surface curving from center line flat. Nozzle can be raised outward to eliminate this effect, which causes loading, heating problems.

to work on it and not bring so many uncoordinated people in as you try to push the schedule on up."

• **An entire testing load and fewer problems in converting from the B-36 to the B-52.**

Boeing KC-115 production will build into it machines 15 a month approximately one year from now but, like the B-52, will not go on to 20 a month in originally planned.

Because B-58 program was cited as one reason for holding down B-52 production, Wilson and Quarles were asked if the B-58 would replace the B-52, either from the B-47.

Quarles said all three are considered uncommitted in stage and all three require reworking. Wilson said the problem there is in what design the B-47 will be replaced by either the B-52 or B-58.

In spite of official optimism over the B-58, USAF procurement officials are cautious about a situation where production will be needed. They pointed out that the B-58 is "a radical bomber" and that "no many other ways are coming along to deliver strategic bombs."

They also said an "standard approach" had been determined as to whether to use powered or unpowered pods. They stated that a B-58 pod combination could become interchangeable without the need for redesigning but said "we don't know yet."

Rules Fixed on Technical Secrets

Washington—Defense Department has passed its first complete set of general rules to govern use by the military services of technical data and copyrights owned by their various contractors.

A new Armed Services Procurement Regulation designed to also protect from even possible misuse of company secrets is also intended to help coordinate and procurement officials agree on what the government needs in the form of technical information and how it will be handled.

According to a USAF spokesman, one of the big advantages will be that all of the military services will now follow one formula, which includes the definition of what kind of data the government needs.

Industry Appearance

The new ASPR, according to experts, should give industry three assurances:

- That the armed services enter most contracts will not demand "industry know-how" but only descriptive data. Except in unusual circumstances, the government official has no reason to demand access to "trade secrets."
- If proprietary information is needed for agency report review, the terms under which it is obtained will be agreed

in advance, and the contractor will retain the right to protect its secrets.

The new regulation divides data into three categories—proprietary, open based and design. Two standard contract clauses are provided. One, for use in contracts and development contracts, is similar to a clause previously prescribed. The second one is for use when proprietary data is required for operational use only.

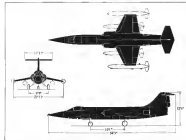
It is the policy of the Defense Department, the regulation says, to acquire such data which is essential

Daily Essential Data

Generally, "operational data" and "design data" should satisfy the requirements.

When "proprietary data" is obtained in connection with a research and development contract, there will be no limitation on its use by the government once it is used. On the other hand, if it is obtained by acquisition under a supply contract, its use will be governed by the purpose for which it was obtained.

The Defense Department said the new regulation—ASPR, Revision No. 21—was worked out after conferring closely with industry and the Industry Advisory Committee on Procurement and Production.



THREEVIEW OF Lockheed F-104. No procurement of this aircraft is planned this year.

Aircraft Industry Salary Report Made to Securities and Exchange

Washington—Following is a list of salaries and bonuses for 1952 totaling more than \$30,000 as reported to the Securities and Exchange Commission by firms in the aircraft manufacturing field.

Boeing Airplane Co.

Total for officers and directors (company compensation): \$154,700. This includes: William M. Allen, president, \$117,000; Clifford B. Smith, vice president, \$10,000; E. E. Wehring, vice president, \$10,000; Edward G. Hyde, vice president, \$10,000; J. O. Sweeney, vice president, \$10,000.

Bell Aircraft Corp.

Total for officers and directors (company compensation): \$143,000. This includes: Lawrence W. Bell, chairman of the board, president, \$100,000; Arthur J. Bell, vice president, \$10,000; William J. Bell, vice president, \$10,000; Henry H. Bell, vice president, \$10,000.

Bendix Aircraft Corp.

Total for officers and directors for year ending Dec. 31 (company compensation): \$100,000. This includes: William B. Bendix, president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000.

Republic Aviation Corp.

Total for officers and directors (company compensation): \$100,000. This includes: William B. Bendix, chairman of the board, president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000.

Lockheed Aircraft Corp.

Total for officers and directors (company compensation): \$100,000. This includes: William B. Bendix, chairman of the board, president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000.

Miller Helicopters

Total officers and directors (company compensation): \$100,000. This includes: William B. Bendix, chairman of the board, president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000.

Chance Vought Aircraft

Total officers and directors (company compensation): \$100,000. This includes: William B. Bendix, chairman of the board, president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000.

Carroll Wright Corp.

Total officers and directors (company compensation): \$100,000. This includes: William B. Bendix, chairman of the board, president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000.

Genco Aircraft Co.

Total officers and directors for year ending Dec. 31 (company compensation): \$100,000. This includes: William B. Bendix, chairman of the board, president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000.

Giese L. Martin Co.

Total officers and directors (company compensation): \$100,000. This includes: William B. Bendix, chairman of the board, president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000.

Ryan Aeronautical Co.

Total officers and directors for year ending Dec. 31 (company compensation): \$100,000. This includes: William B. Bendix, chairman of the board, president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000.

Towson Aircraft Corp.

Total officers and directors (company compensation): \$100,000. This includes: William B. Bendix, chairman of the board, president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000.

United Aircraft Corp.

Total officers and directors (company compensation): \$100,000. This includes: William B. Bendix, chairman of the board, president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000.

Westinghouse Electric Corp.

Total officers and directors (company compensation): \$100,000. This includes: William B. Bendix, chairman of the board, president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000.

North American Aviation Inc.

Total officers and directors for year ending Dec. 31 (company compensation): \$100,000. This includes: William B. Bendix, chairman of the board, president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000.

Douglas Aircraft Co.

Total officers and directors for year ending Dec. 31 (company compensation): \$100,000. This includes: William B. Bendix, chairman of the board, president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000.

McDonnell Aircraft Corp.

Total officers and directors for year ending Dec. 31 (company compensation): \$100,000. This includes: William B. Bendix, chairman of the board, president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000.

Northrop Aircraft Inc.

Total officers and directors for year ending Dec. 31 (company compensation): \$100,000. This includes: William B. Bendix, chairman of the board, president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000.

Piper Aircraft Corp.

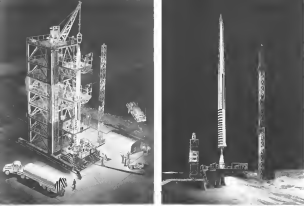
Total officers and directors for year ending Dec. 31 (company compensation): \$100,000. This includes: William B. Bendix, chairman of the board, president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000; J. W. Freeman, vice president, \$10,000.



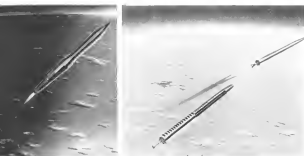
French Develop Support Plane

Report: 1180 transport support plane is planned at Brest. Lightweight air craft—about 10 tons—will be developed by two Frenchmen. The plane is expected to be developed by two Frenchmen. The plane is expected to be developed by two Frenchmen. The plane is expected to be developed by two Frenchmen. The plane is expected to be developed by two Frenchmen.





VANGUARD satellite launching, which is depicted in orbit as it will appear in earth's shadow, at Cape Canaveral Fla., where it will be fired (above). In foreground are fuel tank and support structure. Below is command, Markham control center. With gases issued back by means of exhaust truck, vehicle is fired (right)



AFTER LAUNCHING, the 72 ft., 44-ton vehicle climbs on power of its first stage engine (left). With fuel expended, the first stage drops off into Atlantic Ocean (right). Second stage engine starts vehicle in orbit (right). Satellite itself is shown as it would appear. When second stage reaches orbit height, it burns very short third stage rocket motor (upper) to push satellite to orbital speed. Separate motor impact spot to third stage assembly for stabilization

Second Stage Vanguard Engine Ready

Los Angeles, Calif.—Acrojet General Corp. is ready to deliver within a few weeks the second stage propulsion system for Project Vanguard, says Philip Plummer, chief of Acrojet's engineering department.

Plummer says that the Vanguard system is being developed by the Air Force Research Office, Dayton, Ohio, and is being developed by the Air Force Research Office, Dayton, Ohio, and is being developed by the Air Force Research Office, Dayton, Ohio.

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plum of a propellant produced from a fertilizer and coal gas oil," Kramel declared.

Experiments in Acrojet's Structural Properties Division are concerned with use of aluminum or steel step-wrapped chambers bonded with plastic to replace the conventional steel or titanium chambers. This wrapped chamber approach is being considered for several rockets Acrojet now has under development, Kramel stated.

Plastics also are being considered for reduction in weight of hydrostatic members, components and fittings. A new plastic using structural plastic is being developed that can provide complete hydrostatic manufacturing for actuation systems at lower cost, lighter weight and with lower pressure drops than is possible with current technology, Kramel declared. Plastics such as glass-reinforced phenolic and epoxy resins can be used to make this material withstand temperatures up to 1,500°F.

British Missiles Are Placed in Production

London—Production orders for the British guided missile have been placed by the government. These are in addition to the Titan, British training missile now being delivered to the Royal Air Force.

Members of Supply Agents' Association and the British Propeller Co. will supply an anti-air weapon and British Aerospace Co. and English Electric will supply the missile.

On March 24, 1957, when an order for the first of the British missile will be placed by the British Government.

The British missile is being developed by the British Government.

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Vanguard Test

Patrick AFB, Fla.—May's annual test vehicle in the Vanguard rocket satellite program has undergone a successful static firing in USAF's Missile Test Center. A Vanguard rocket was fired by the Missile Test Center on May 10. The test was the first of a series of tests scheduled for the next three months. It will be made in a prototype of the third stage solid propellant motor that will push the satellite into orbit in the last phase of the launching.

Convair Missile Contracts Awarded

Contract worth \$55 million for Atlas ICBM guidance work has been awarded to General Electric's Heavy Military Equipment Department. Award of the missile guidance has resulted in a new missile guidance system being set up in the GE department, according to an announcement by the company.

Two results for Convair missile work also have been awarded to other firms. Southwestern Industries, Inc., Los Angeles, will design and manufacture guidance systems. Convair also has received a \$4 million contract for the design and development of a new missile guidance system. The contract is for the design and development of a new missile guidance system. The contract is for the design and development of a new missile guidance system.

GE's contract includes provision for work to date which has been proceeding for two years on an equalized contract basis and also for extensive additional work.

The new GE guidance system is described as unique in the company's organization in that it has its own engineering, manufacturing, marketing, finance and administrative groups. These units normally make up a full department, GE said. Section's function will be to "support and maintain" the effort previously handled by a task force drawn from participating elements of the company.

New section will be headed by R. E. Shaffer, who has been heading a special GE group working on another "high speed" defense project.



T2J Mockup Completed

T2J mockup is pictured in North Avonport, Inc. plant at Columbus, Ohio. Westinghouse [14 engine developing 1,400 lb thrust with power for 90-mph cruise. Plans will weigh about 5,000 lb., reach about 40,000 ft altitude. Development is under contract from Navy.

Gains Made in Military Contracts

Washington—U. S. aviation and aerospace industries have made substantial gains in obtaining new military contracts.

New figures released by the Department of Defense for the 18-month period ending last June 30 show that North American Aviation, Inc., topped the list of the 100 largest defense contractors. Its receipts for the period totaled \$1.14+ million. The company was closely followed by General Dynamics, parent corporation of Convair, with \$1.139 million.

Procurement Rise

Defense Department sources set in relieving the figures that the percentage of total procurement awarded to the 100 largest contractors is higher for the 18-month period—58.7%—than it is for the same years from 1910 to 1956.

There are two principal reasons for the rise:

- Acquisition of new facilities by large prime contractors
- Expansion on aircraft, missiles and other complex systems that can be purchased only from large prime contractors.

In the listing according to value of awards over a 10-year period, General Motors Corp. still leads the tabulation

with contracts totaling \$6,965 million. It is followed by Boeing Airplane Co., with \$6,175 million, United Aircraft, with \$5,151 million, General Electric Co., with \$4,755 million, and Douglas Aircraft, with \$4,251 million. North American is sixth on that list with \$4,150 million, followed closely by General Dynamics and Lockheed Aircraft.

The Defense Department pointed out that only part of the prime contract funds are retained by prime contractors.

For example, 74 of the big prime contractors reported that 56.9% of their total military income went out to subcontractors and 20.7% went to small business in the six-month period ending Dec. 31, 1956.

Other Leaders

Tabulation for the 18 months ending last June 30 shows that other aircraft and aerospace manufacturers, with rank among the top 100 firms and amount of contract awards:

	Amount Rank (Millions)
Lockheed Aircraft Corp.	8 \$ 5657
Douglas Aircraft Co., Inc.	9 \$ 3785

McDonnell Aircraft Corp.	10 \$ 322
Hughes Aircraft Co.	11 \$ 477
Curtis Wright Corp.	12 \$ 464
Gleim L. Martin Co.	13 \$ 456
Boeing Aircraft Corp.	14 \$ 295
Chrysler-Vought Aircraft Corp.	17 \$ 321
Sperry Rand Corp.	19 \$ 217
Republic Aviation Corp.	20 \$ 205
General Tire & Rubber Co.	24 \$ 168

High Sales Shown For First Quarter

Record first quarter sales and net income are reported by aircraft industry and company's competitors.

Many companies expect larger percentage increases for the rest of 1957, according to their reports. Some firms, however, experienced disappointing first quarters.

Individual results of aircraft and component firms for the first quarter of 1957 included:

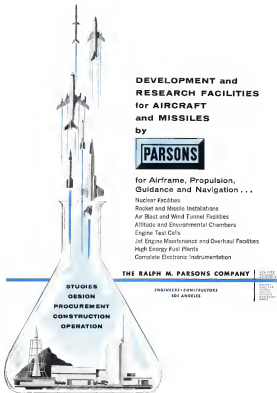
• **Martin Co.**, whose stock holders voted to change its name from The Glenn L. Martin Co., announced sales for the period of \$88,748,334, up 91% over first quarter 1956. Net income was \$2,099,533, equivalent of 69 cents per share, up from \$1,586,725 or 50



DOLLAR ENGINEERING—Advanced aerial weapons bearing the Northrop name are developed to achieve maximum economy through ease of production, maintenance, and operation. A notable example is the new supersonic trainer now being developed by Northrop for the U. S. Air Force. Light in weight and low in cost, this airplane embodies a basic concept which can result in a whole new family of effective aerial weapons, all built by the same principle of simple and economical design. Since national defense dollars and national manpower are in short supply Northrop will continue to introduce the dollar into the engineering equation; will continue to employ "dollar engineering" in using the best science and technology to create the low-cost solution to a national defense problem and produce more Air Force per dollar of national defense budget.



NORTHROP
NORTHROP AIRCRAFT, INC., BERKELEY, CALIFORNIA



DEVELOPMENT and RESEARCH FACILITIES for AIRCRAFT and MISSILES by



for Airframe, Propulsion,
Guidance and Navigation . . .

Nuclear Facilities
Rocket and Missile Installations
Air Blast and Wind Tunnel Facilities
Altitude and Environmental Chambers
Engine Test Cells
Jet Engine Maintenance and Overhaul Facilities
High Energy Fuel Plants
Complete Electronic Instrumentation

THE RALPH M. PARSONS COMPANY

ENGINEERS • CONSTRUCTORS
LOS ANGELES

DESIGN
PROCUREMENT
CONSTRUCTION
OPERATION

cents per share, below forecast to be about eight dollars during end of year, but not is expected to increase.

•**Bentley Aircraft Corp.** first quarter (second fiscal quarter), 1957 sales totaled \$18,668,715, an increase of 15% over previous three months.

Sales for first six months of fiscal 1957 totaled \$18,111,115, up 50% over same period of last fiscal year. Quarterly sales for later period totaled \$1,950,406 up from \$1,273,182 for first half of fiscal 1956. On April 1, Bentley's fiscal year was \$111 million up from \$112 million on April 1, 1956.

•**General Electric** first quarter sales totaled \$1,048,850,000, an increase of 11% over first quarter 1956. Net earnings were \$64,686,000, up 16%. Last six months were up 7% over previous six months. GE says it plans to spend \$165 million in new plant and equipment during 1957.

•**Boeing Corp.** first quarter was

"not as satisfactory as expected," with sales up only 1.2% to \$164,545,222 and net income down from \$4,911,065 to \$3,828,165.

The increase in employees' wages and taxes were cited by Roy Warner as reasons for decrease. Military and space cargo work by company as added to report indicated, contributing to BFW has order backlog. Jeppesen, Keller von Dornier, major inside company production, and Masco/Schubler Products Division, manufacturers of nuclear reactor control and mechanisms.

•**Chrysler Aircraft Division**, first quarter \$1,010,232 net up last quarter at \$1,421,953 for the quarter. Backlog at March 31 was \$308 million. Third quarter 1956 sales totaled \$22,512,160, net income was \$749,791.

•**Eastman-Kodak Co.** sales were up \$35% to \$58,578,192 for the quarter, and net income was down from \$5,760,779 to \$5,055,232.

large scale orders are placed several in part) increases will be made in the program.

Two New Escape Seats Developed

Two new ejection seats for jet-powered aircraft are being developed by the Institute for Aerospace Systems Committee, established last year for this purpose in the Air Force.

Two seats are:
•**AB-200**, envisioned Aerial Bailed-out which retains the pilot 90 deg. backward so that he enters the ship's track first. Bottom of the seat protects him from the violent air blast. In the extreme position the seat looks like a baby-sit.

•**AB-200**, an ejection ejection version of the forward-facing ship's power seat developed by Lockheed and coordinated into the IC-350 program.

Recent advances point to these characteristics of the seat, held position assumed by the pilot with arms down up protect him from wind blast and strengthening of the seat in its impact position reduce deceleration forces and less stabilize the seat after ejection.

AB-200, which also has good deceleration and stability characteristics, has the other advantages of weighing less than the AB-200, is simpler to operate and has greater compatibility with cockpit configurations of various Century Series fighters.

IC-350 has recommended that both B and A configurations be developed through this test phase.

Lockheed's development ejection seat, for the F104A, has already undergone successful high speed sled tests at Langley Mass (AW 275, p. 147).

Stearns Aerospace Corporation, Denver, is making heated quantities of the B and A seats, and is also manufacturing the Lockheed D seat.

Final selection and review of the Air Force ejection escape system development program is scheduled for this fall.

News Digest

Engel engine generator plants which can be disassembled and transported by air, will be constructed by Aer Products, Inc., Allentown, Pa., on day an Avco contract. Each plant will be able to produce 50 hour of high power liquid oxygen a day for missile use.

North Industries, Inc., Bufile, Mass., will deliver 59 million north of sodium borate double for "evaporate" fuel program during next eight months.

Fight Fighter Entries Readied Despite Apathy to NATO Plan

Fair-Competition among the three official entries in NATO's lightweight fighter program is slated to get under way early in August despite fact that few NATO nations are interested in the project and some are hostile against it.

Officially, an public criticism has been directed at the program by one NATO country. But several defense executives have firmly told NATO that unless the program is revised this probably would not be entered in a program. Complaints have been made that the program was ill conceived, that original specifications had done for the so-called standard NATO light weight support fighter, were not realistic.

NATO's lightweight support fighter program was launched several years ago. It has been financed mainly by U. S. funds. Idea is that NATO will select, after competitive evaluation tests, one of three lightweight support fighter programs under development in NATO countries. Once the winner is picked, then various NATO countries would join in the production of some 1,000 units of the aircraft, which would be integrated into NATO air force.

In France, Avions Dassault has begun flight tests on its entry, the Etendard VI. Also in France, Breguet is working flight tests on its entry, the T-10. Production of first aircraft was delayed because the T-10 was redesigned to fit the new role concept. It is slated to make its first flight early in June. The third NATO competitor is the Italian G. 91, built by Fiat. Fiat is readying its second G. 91 prototype for its initial flight.

Test prototype entered several weeks ago following flight disintegration.

All three entries are powered by Bristol Olympus turbojet. Powerplant was selected by NATO at beginning of program and the three entries now designed more or less to fit the Olympus. Regarded, however, the Olympus III, a single spool lightweight turbojet developing some 2,300 lb static thrust, has not come up to original expectations. Bristol reportedly is working on a new design, which has been made the Olympus II. No performance details have been released on this engine though it is understood it was not fit into any of the three NATO lightweight fighters marked in the competition.

Actually, NATO has already allowed its program somewhat by giving authority to evaluate Sud Aviation's tactical fighter, the Bourdon.

The fighter, however, from the three official NATO entries was originally considered by NATO some years ago and then dropped. Five Bourbons have been built by Sud Aviation. The aircraft, which takes off from a runway and has an retractable sled, is being fitted with a Saucier Alar developing 7,715 lb thrust. Sud Aviation also is planning to install a more powerful engine in the Bourdon and the company expects that the aircraft can take the projected Olympus 12 without any design revision.

Meanwhile NATO is making ready for the competition to begin—probably in the first week of August. But many NATO countries think that before any

Curtis Details Traffic Control Program

Three-phase plan designed to increase capacity, decrease collision hazard 10-fold by 1975.

By Philip J. Klaus

Washington—Three-phase traffic control system engineering program designed to provide a 10-fold increase in capacity plus a 10-fold reduction in the collision hazard by 1975 will be presented to the White House this week by Presidential Advisor Edward P. Curtis.

The system engineering report is the result of a year-long study by a team of 18 experts headed by Preston Bissett, former president of Sperry Corporation, and operating under the guidance of James L. Arant, system planning adviser to Curtis.

The recommended program consists of three phases:

- **Immediate:** Augmentation of the present Civil Aeronautics Administration's current management program (AW April 22, p. 26) by the formation of an operations research group in CAA to seek improved operational procedures and by expanding CAA's traffic control facilities.

- **Intermediate:** Augmentation of the present Civil Aeronautics Administration's current management program (AW April 22, p. 26) by the formation of an operations research group in CAA to seek improved operational procedures and by expanding CAA's traffic control facilities.

- **Long Range:** Establishment of a permanent organization and program for control underdevelopment. This organization, taking over the functions of an interim Airway Modernization Board, would institute a central authority group to establish a national policy, coordinate activity, enforce laboratory, an experimental facility and operations studies.

First of Three Tasks

"The report marks the completion of one of three tasks which the President assigned to his special committee for revenue facilities planning. Curtis is preparing final reports on the two remaining tasks, one dealing with recommended changes in the organization of government aviation activities other with attitudes of the number and types of aircraft likely to be operating in 1975.

Recent report by the President for organizational authority to create an interim Airway Modernization Board (AW April 15, p. 28) is intended to permit speedy initiation of some of the system analysis, engineering and control recommendations contained in the same various engineering report, pending the major reorganization which is expected to take some time.

The program will cost an estimated \$77-80 million annually, a figure that does not include the cost of buying and installing operational equipment for Common System use.

The reorganization of the civil aviation engineering report can be briefly divided into two categories: new aviation devices and systems and new operational philosophies, including one-way speed-separated routes.

New Aerial Developments

Arant revealed that the entire engineering team's study has produced a number of promising new aerial developments and techniques which bear further investigation and evaluation for near future use. The examples:

- **Three-dimensional radar** for horizontal and vertical control of aircraft traffic in the air.
- **Low-frequency (LUF) radar** now being developed for air defense use may offer advantages for air traffic control over existing microwave radars because it is not susceptible to clutter from precipitation.
- **New position reporting techniques** that might eventually replace or supplement ground radar as a means of determining altitude, air, altitude, position and altitude. These include computer systems based upon electronic timing or use of some of the transponder range techniques, Arant said. One such system reportedly uses a paired transmitter in the airplane and several ground stations to obtain a fix of receiver location technique.

- **Hyperbolic navigation system** to provide flexible means at high altitudes and high-accuracy tracks over several areas.
- **Vertical velocity of air** from the Air Force's Altus has proposed new technique that might permit modification of maneuvering (Vertical) stations to provide hyperbolic area coverage, yet retain the advantages of operation in the VHF band which is not susceptible to atmospheric absorption.

The system engineering report also calls for development and/or evaluation of:

- **Extended glide slope** beams to provide three-dimensional information to aircraft in instrument approaches.
- **Acoustic and visual changes** for marking the boundaries of controlled separation areas to prevent unauthorized intrusions by aircraft operating in uncontrolled areas, a more also provided by Airway Modernization.
- **Directional communication systems** which might include ground stations to simultaneously transmit two or more communications at the same frequency to aircraft in different sectors without interference in order to reduce radio spectrum congestion.
- **Dead aircraft computer** to automatically provide pilot with continuous indication of his position and enable him to navigate in the event his position remains unreported.

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Denotation

The system engineering report recommends that present terminal area control system be subdivided so that each controller has no more than three aircraft under his jurisdiction. As soon as possible, the system engineering team will be the operations task could be increased. Today a controller can handle up to 25 aircraft simultaneously, Arant said.

One subdivision of control will be to use the use of semi-automatic techniques for strong and transferring flight plan data between controllers and by displaying the traffic situation.

Some of the system engineering team's recommendations include an ATIS on defense and the Army's Nike-Master used to controlling a number of Nike batteries has produced a number of electronic data processing (data) and display techniques which Arant said could be adapted to Common System use. This will be one of the major efforts by the proposed Airway Modernization Board and its electronic research.

One possible display console described by Arant would show aircraft radar blips surrounded by a small circle which moves with the aircraft blip. In the event of radar failure, an automatic dead reckoning computer on the

ground would trace the circle to maintain its position and the scope at the operator's feet would speed and heading would speed radar could be brought into operation.

When cleared, the controller could call out and display on the console the full flight plan data for each aircraft on the scope. To transfer an aircraft to an adjacent controller, he would push a button which causes the target blip to appear on his controller's scope. A flashing light would signal the change in the new controller.

The system engineering team recommends the development of an air traffic control system (ATCS) (ATCSB), or data base, but emphasizes that two-way voice communication will remain the basic mode of communication for at least some years.

Arant said ATCSB, together with new communication techniques such as directional antennas and selective calling, should provide additional capacity in present voice radio channels.

While the Curtis system engineering team began to design a system, it would be possible to use some of all of SACRE for traffic control problems. Further investigation indicated the team had been too conservative. The group then considered a more realistic alternative would be to design the ATC system and SACRE so that each could make use of information available within the other.

For example, the Common System should have control systems in aircraft flight plan and position reports should be in the SACRE computer as well as to the SACRE radar and data link receiver to an defense network. Thus its limited capabilities would be used to the system would be used before this two-way communication between SACRE and ATC can be realized.

Arant said the new system and data network techniques should make it possible to perfect automatic systems when flow control measures would be necessary and to display, automatically, such information as airports in service, instrument and position reports.

Members of the Curtis system engineering team, in addition to Bissett and Arant, included Dr. Samuel Cleveland, head of the National Bureau of Standards data processing laboratory; Charles E. Dwyer, operations research specialist; Dr. Ralph Peterson, vice president of control of the Radio Wavelengths Corp., Lind Park, consulting engineer; Dr. Ralph Pearl, chief of the Department of Defense's Medical Laboratory, Norwood, director of CAA controller and consultant; Martin Winslow, airport expert with the Port of New York Authority, and Michael Williams, professor of aeronautical engineering at St. Louis University.

Curtis Program Provides Lateral, Vertical Separation of All Aircraft

By L. L. Doty

Washington—A system system for lateral and vertical separation of aircraft is being proposed by the Airway Modernization Board.

The system is a key factor in the proposed system of engineering, its new plan (see page 13) which Edward P. Curtis will present to President Eisenhower later this week.

If adopted, it will provide for the first time in U.S. airspace lateral separation of aircraft by vertical separation according to speed class. The group estimates that the system will permit a capacity of 150 aircraft per hour in an airspace at eight altitudes on each high speed class, a 10-fold increase over the current system between Washington and New York.

Navigation Plans

The plan calls for two basic modes of operation:

- **Altitude-Weather mode:** All flights above 10,000 ft. would be under positive control under all weather conditions. As air traffic control capability increases, the four new proposed altitudes in this mode would include that may occur under all appropriate frequency, horizontal altitude and navigation elements of a known accuracy.

- **Dead mode:** Aircraft operating under the current mode in VFR or IFR conditions would be under positive control in clear weather conditions. As air traffic control is required, aircraft operating in the dead mode may be required to meet certain standards of cockpit visibility and to follow established speed limits, probably 150 knots. Maximum intra-arrival separation would be the horizontal distance.

Arant said that for several years air controllers would be required to use lateral and vertical separation and adhere to airway boundaries would be required since only VFR mode will apply at present of aircraft's altitude.

The group considers that two-way voice communication will be required later in the electronic warning system may be needed to prevent crossing over into controlled airspace. The altimeter is designed to provide a primary warning of altitude in the event of a radio failure.

Flight path clearance at high density routes below 10,000 ft. would be fixed, but above 10,000 ft. airspace would be flexible through the use of hypersonic altimeters and lateral and vertical separation with free to define airspace.

Flexible airspace will permit allocation of back tracks for weather avoidance.

The introduction of six parallel airways between Washington and New York will call for an additional VFR altitudes for the route. Using the new airspace with an additional separation of aircraft by eight altitudes, aircraft will be dispatched to each one of the 48 altitudes over all altitudes.

The New York National Airways, such as an example in the Group report, will be divided into two blocks for operating as route.

First and Descent Area

Also on route, will be a section designed with the climb and descent area for use in "path stretching." For example, those aircraft operating on density above the other would be required to climb to a higher altitude within the climb and descent area whenever any change in altitude is required.

Operating under radar control, the aircraft would be under control from the altitudes, not the altitudes, and the altitudes to the designated parallel areas of the new altitudes. Path-stretching will permit the Strategic Air Command to apply the step-down principle.

Buffer zones around airports will be provided for holding and take-off. High performance aircraft will be assigned to buffer zones directly over the airport. Low performance aircraft will be placed in buffer zones adjacent to the airport.

Buffer zones for high-performance aircraft will extend upward from 4,500 ft. Low performance aircraft buffer zones will be confined to altitudes below 1,500 ft. and 1,500 ft. Landing paths will include approach below 1,500 ft.

'Assent Zones'

Arant will be led from the altitudes to landing zones through "assent zones" created to permit segregation of traffic by controllers. The Curtis group feels that under its system, no controller will be handling more than three aircraft at one time.

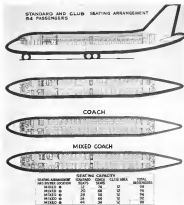
Assent zones can be compared to slanting chutes dropping from the altitudes at varying altitudes into the buffer zones which will be six to 15 miles in size. Aircraft will be directed to these slanted altitudes in the buffer zones through at least four steps: one at one time. How into the high-performance zone will be conducted simultaneously with the first into the low performance zone.

Assent zones will be arranged so that



First 880 Fuselage Section

First Conquest 880 jet transport fuselage section (top) is assembled for test run. The 26-ft long section will be sold tested in temperature simulating 45,000 ft. In test cells heating system will be opened to measure temperature heat loads to test air conditioning. Interior like that of mixed airplane will then be installed and will be tested with noise of jet engines simulated. Variations in seating arrangement for the 880 are shown in schematic (below). Configurations include standard and club, coach and mixed coach or two-coach and three-coach layouts.



there is no conflict of traffic in moving aircraft into Nevada, California, etc. and into California at the same time.

The group points out that runway capacity under IIR conditions can be doubled with parallel runways in an angle pattern. An increased acceptance rate, however, can be expected through the location of buffer zones in stacks directly over the airport rather than at point to it.

Intercept operations will be conducted through an audio control channel and angle of intercept of intercept aircraft will be run through access zone through the use of an attack beam.

Thus, only a small sector of the access zone will be blocked off for intercept aircraft, and normal traffic flow can continue unimpeded.

The Conquest group envisages a three-runway arrangement as an ideal airport. A short runway, with its own terminal facilities should be available to low performance aircraft. Parallel to this, but some distance from it, should be the runway for high performance aircraft with separate terminal facilities. Its upper landing fields should be placed in such a manner that landing paths will not cross approach paths of other aircraft.

The group also advocates a 60 to 70 mph speed for final-way aircraft. It has suggested the use of an electron magnetic marker gradient to control ground traffic. The British have been experimenting with this type of control, using a current cable buried in the ground.

Also recommended is an airport sign system to direct pilots in landing procedures.

That is what the Conquest group says is required for otherwise high capacity runway systems.

- Surveillance radar
- VHF and UHF communications
- ILS and precision radar approach
- High intensity approach and station lights
- High-speed cone with good marking
- Navstar gauge flush runway lighting
- Brakes visual range increasing capacity
- Run-up and by-pass paths at narrow ends
- Standby power for all facilities
- All facilities installed for directional use

New Cockpit Layout Proposed by CAB

Washington—Recommendation of flight instruments to conform with cockpit as active pilots for proposed cockpit panel design is being proposed by the Civil Aeronautics Board's Bureau of Safety.

The second arrangement, proposed

Caravelle Shows Gallic Artistry

Cabin interior of French twin jet Caravelle reflects showy touches of French artistic temperament with use of abstraction (at prototype below). To demonstrate quiet ease of aircraft, Meautz used a pilot once headquarters located near an island in each one of seats. These are 12 seats in 31 rows. Competing in gap, instrument panel and cockpit layout (right) include European style control columns. Engine instruments on control over pilot's. The second prototype around is due to begin test of U.S. this week.



under a CAB draft release, ends a long campaign by the Jet Line Pilot Association for the adoption of new standard locations of such of the basic six flight instruments.

The new ruling will apply only to new aircraft coming off production line, but most airlines are expected to make the change in order to achieve standardization for operating safety.

The proposed arrangement calls for two rows of three instruments each. Top center position is taken by the bank and turn (attitude) indicator, the basic instrument under IIR conditions. Whichever indicator for position-direction is located in lower center position on the floor, that the instrument is mounted consistently in comparison with the bank-and-turn indicator to maintain that dimensional control.

Speed indicator is located on top left, the direction on the top right wing both arranged and altitude are directly related to altitude.

The flight path deviation or ILS indicator and glide path instrument is located in the lower left area and rate



of climb is placed on the lower right side of the grouping.

Main advantage of the new arrangement is a provision providing for flexibility of instrument location which location of one instrument can be combined with another.

For example, ILS can be placed in the lower center position which combined with the attitude indicator. The third space can be filled by a radio magnetic indicator or Machmeter.

The bid for the new arrangement began last year when Capital Airlines requested an exemption from standards established in 1955 by the CAB. The airline, wanted to relocate instruments on its Viscount fleet to an arrangement similar to that proposed by the CAB.

Capital was later backed by ALPA at the annual convention meeting, but the CAB deferred a decision pending further review of the issue (AW Sept. 31, p. 36). A Capital official told Aviation Week that the punch of the airline's Viscount tailfinary transport would be modified once the draft release was approved.

Bilateral Treaty Signed With Korea

Washington—Korea was the first to work in arranging an airline to connect that republic and the U.S.

Under terms of an agreement between the two countries, Korea can designate an airline as airlines to provide service over the Great Circle route to Alaska and Seattle. The U.S. can designate an airline or airlines to provide service between points in the U.S. to Seoul and beyond.

The new agreement replaces a provisional agreement between the two countries that has been in effect since June 29, 1949. Under the provisional agreement, Northwest Airlines has been operating between the U.S. and Korea via Seattle, Alaska and Tokyo. However, no specific route to the U.S. for Korean airlines carriers was described in the earlier agreement.

It was the fourth bilateral signed by the U.S. this year. Others went with Iran, Mexico and the Netherlands.

Trans American Loses Battle

Washington—Trans American Airlines' challenge of the regulatory act carriers, lost its last legal encounter last week in a long fight for survival. It has 45 days to wind up its affairs and go out of business.

In its last chance for continued operation, disappointed when the U.S. Supreme Court refused to review a Civil Aeronautics Board ruling which ordered the company out of business for violation of the Civil Aeronautics Act.

The Supreme Court action made final a U.S. Court of Appeals decision which upheld the CAB (AW Dec. 31, p. 47). The four separate members of the Trans American group and Transwest Airways, United National Airlines, Trans American Airlines and Transcontinental Airlines. The CAB found, in its investigation of the group and the U.S. Court of Appeals later reported the finding, that "the carrier was not controlled or owned by four persons, J. B. Lewis, James Davidson Stanley Weiss and R. R. Holt."

The fourth airline, Transwest Air Transport, is owned by Jacob David Adelson of New York, as a sole proprietorship. The Board found that Adelson "acted or acted" as the owner's agent in relation to the "North American (Trans American) combine" and "unlawfully control over the operations of Transwest" to the group.

The Board also found that the four persons owned and issued stock in the four carrier entities as partners or subsidiaries through the partnership Republic Aircoast Service, Transwest Airlines Co., Standard Aircoast Co. and California Aircoast Co. The suit arose in a brief on July 1, 1955 when the CAB revised the Letter of Registration of the four carrier air line courts.

Operation of a routine engaged in unauthorized direct, frequent and

regular transportation service. Consolidation of properties into one person in violation of the Civil Aeronautics Act. Collective and individual advertising and operation of regular and frequent transportation. Violation of the Civil Aeronautics Act which related CAB economic regulations.

In making its decision in the non-ghosted case, the Board declared that when it cut through the web of intercompany sharing and technical devices employed by the respondents, it is a plain fact that the respondents have attempted to make a monopoly of the Board's regulations and to operate without regard for the requirements of the Civil Aeronautics Act.

In addition to violating the operating standards of the carrier, the Board ordered immediate compliance with rules governing irregular carriers in the "lease and lease" operations.

Trans American opposed the decision and the CAB stated the prohibition order pending legal action but refused to stop the "lease and lease" or "lease" operations.

As a result, Trans American was able to continue its operations under the one rule reviewed by the Appeals Court.

It was not until Dec. 30, 1956, that the Court of Appeals handed down its decision which affirmed both the economic order and the lease and lease order and upheld the Board's findings.

Trans American was originally formed in North American Airlines, Inc. was forced to change its corporate name last June when the Supreme Court refused to review the case and upheld a lower court ruling that granted North American Airlines Inc. as a monopoly controlling the airline from among North American in its line. American Airlines filed complaints against the use of

N.Y.-Mexico Route

Washington—New American World Airways has received a route grant from the Civil Aeronautics Board for a New York to Mexico City route. It is expected by the Board and the President, it would give the American line of the same U.S.-Mexico routes granted to the newly opened air line.

"American" is part of the title.

The Supreme Court's latest action generally did not come as a surprise. The airline already had made plans to lose seven DC-4s to Eastern Airlines for the route (AW April 17, p. 26). Loss of the planes will mean that more than 512 million to the group for the five years.

Following the Supreme Court action, a company spokesman said he knew of no plans to change the existing fleet of five DC-4s and one DC-3 in a different type of service.

Continental Shifts to PAC to Overhaul J57s

Boeing, Calif.-Pacific Airmotive Corp. will overhaul Pacific and Whitney J57 turbojet engines which will power Continental Air Lines' Boeing 707 scheduled for service as the carrier's new routes between Chicago, Kansas City, Denver and Los Angeles by August, 1957.

PAC is planning to test jet engine stock capable of testing the J57, and the higher thrust PWJ J57 turbojet which will power later versions of the Boeing 707 and Douglas DC-3 transports. It plans to inspect equipment to check and accessories for the J57.

Continental originally intended to set up jet engine overhaul facilities at its new maintenance and overhaul base at Los Angeles International Airport (see p. 44). According to Robert F. St. Clair, Continental President, engine overhaul of necessary cash outlay to set up jet engine overhaul facility and time required to have personnel made it evident that substantial savings in operations would result from using PAC's jet engine facilities and personnel.

Agreement a PAC's first for a new jet engine overhaul.

In a move to strengthen its own position along new commercial lines, Continental added the Civil Aeronautics Board last week for authority to temporarily suspend its act for five years on routes—Boeing-Boeing, Miami-Walk, Seattle-Southwest and Phoenix. All were served by Pioneer Air Lines before the two companies merged.

CAB Agrees to Defer Study of Fare Cut

Washington—Civil Aeronautics Board agreed last week to defer consideration of a possible reduction in existing air fares during current proceedings in which an airline is asking to increase the rates. The CAB added, however, that the issue of a possible fare cut would not be excluded from the case—only deferred until further Board order.

The Board's action was taken after referees petitioned the CAB to modify its original order of suspension and re-evaluation which stated the proceedings.

The CAB said in the order that it would consider proposals for the increase and at the close of the case, would prescribe brief rates—higher lower, or the same as those now in effect.

The airlines argued that a possible fare reduction was not in issue in the proceedings but that it was part of the general fare re-evaluation and that its inclusion would make making the case (AW April 1, p. 48).

In response to the petition, the CAB said its purpose in the case of fare proceedings was to re-evaluate the reasonableness of the present fare rates being asked by the airlines.

The Board also agreed that the case of a decrease might suit in expanding the scope of the case and directed the airlines to defer the issue until further order.

The fare cut petition pertained to the Board's Dec. 1956, Northwest United and Western. Although Western did not file for a fare increase, it was made party to the proceedings by the Board.

The action also asked the Board to include other methods of determining the "current" element in addition to the fare action upon original cost of new line book depreciation. The request was denied, however.

The hearing was originally scheduled to commence last week but has been postponed to May 7 at the request of Bureau Counsel.

Earlier, the CAB approved an agreement with Air Transport Union, which provides a general 15% fare increase for transportation originating and terminating within Europe.

Agreement was given on the condition that the increase will not be used in the construction of fare reductions for those for travel which between points in Europe.

A request for fare increase across the North Atlantic airline has been discontinued by the CAB (AW April 22, p. 43).

AIRLINE OBSERVER

Airline will be the next country to begin bilateral negotiations with the U.S. Talks will begin next month and will be followed by a suspension of the Brussels bilateral agreement with Britain. This agreement, due to be held with France, Belgium and Switzerland in that order.

The Supreme Court last week reaffirmed a decision that Eastern Airlines would be changes involving June 1, 1948 evidence between a P-35 pilot by the changes or face offer and an Eastern Airlines DC-4 near Washington National Airport. Previously, the government was found liable under the Federal Trusts Claims Act because the control tower had cleared both planes to land simultaneously. Technical claims against both Eastern and the government now are to be settled. The courts have agreed that the crash occurred over the District of Columbia instead of Virginia. Virginia limits individual damage claims to \$15,000 per person, but Eastern will be forced to settle under District laws, which have no such restrictions. However, the government will benefit by the state law, since control tower is in Virginia.

Civil Aeronautics Administration reports a sharp decline in the number of airline accidents caused by underheating since 1945 although the lowest number of such accidents per one million loadings occurred in 1951. There has been a slight rise in such accidents since that time. During the period between 1946 and 1955, 75 per cent of such accidents were reported with a resultant 384 fatalities. Fifty three of the accidents were in passenger service.

Impairment of last week reported a 17 month, five day record of fatalities—openings to equal a previous record established by the scheduled non-stop flight from March 28, 1959, and August 31, 1958, according to A. J. Ryan, Washington representative for General Airways and Mettler Air Transport. Ryan said that more 40 general carriers flew more than two billion passenger-miles during the period without a fatality.

Lufthansa German Airlines will continue flight to Istanbul by 735 on May 1 but will have no change in route as direct flights from Frankfurt, Nuremberg, Stuttgart and Munich to Switzerland.

Air India International began a once-a-week service between London and Cairo this month to open the first direct air link between Britain and Egypt since Suez hostilities began last October.

Civil Aeronautics Administration will allocate training personnel and training equipment from high density control units. Scheduled personnel in face facilities. CAB officials say, are too low, to adequately train in on the job training programs.

Flying Tiger Line has ordered two additional Lockheed 1049Bs to begin its first flight of Super Constellation to 12. Service with the new aircraft will begin on May 1 between New York and Los Angeles. Flights are scheduled under lease with Air Finance Corp., which purchased the aircraft directly from Lockheed.

Boeing and Western Airlines will introduce a special seasonality rate of 65 cents per lb. for the freight movement of household goods between New York and Athens, Greece.

Trans World Airlines has phased out the last of its DC-3s due to the sale of most of the aircraft to Lowland Aeronautics Sales of Miami. The airline has not scheduled DC-3 service since 1955 but has used the aircraft for charter flights, cargo flights and business instructions. TWA operated the last of DC-3s on its routes in 1954.

New Greek airline, Olympic Airways, will be operated in France and French Union by Union Aeronautique des Transports. The carrier has begun service with DC-4 service between Athens, Rome, Paris and London. Beginning June 1, service will be increased to four flights a week with DC-6 equipment.



Braniff Starts Work on Base

Braniff Airways broke ground recently for a \$4,150,000 maintenance and operations base at Love Field, Dallas, Tex. Airline headquarters are in Dallas.



HANGAR and office at Los Angeles planned by Continental include phase I, 1957 structure (left), expanded 1959 hangar (right)



CONTINENTAL's air ticket office being built at downtown Los Angeles with interior (left) and exterior (right)

Continental Starts Turbine Integration

By George L. Christian

Denver—Continental Air Lines is now looking on a three-phase expansion program to integrate into its growing fleet three new types of transports—Douglas DC-7Bs, Viscon Viscosets and Boeing 707s.

The airline is building a maintenance base at Los Angeles International Airport which will develop through three phases into a 707 maintenance and overhaul base. Los Angeles is a terminal station, was selected because, as a CAL spokesman put it, "it will be equipped to terminate 707s at our newest Denver maintenance and overhaul base. You can't load 136 passengers on a 707 at a mid-line station except because the plane has to go to the overhaul unit one mile to the east of the base."

Expansion Phases

Here is how Continental has mapped its program:
 • **Phase I**—Starts officially on April 18

with the migration of Chicago Denver-Los Angeles non-stop, all-rack DC-7Bs. Kansas City will be reloaded on some of the runs to San Francisco. Los Angeles base will be activated with the beginning of DC-7B flights. Currently, only two services, such as purchasing and accounting, are based at up to the April 18 date. When the DC-7B start operating, some 30 maintenance personnel will be on hand at Los Angeles to handle new arrivals. The base, however, is in working shape now to handle the first DC-7B Continental flies on order.

• **Phase II**—Kicks off on about May 1, 1955 with beginning of Viscon service between Chicago and Los Angeles. First seven of the 15 Visconets CAL has on order (there is a contract for 5 more) will be put into service on this date.

The Los Angeles base will provide periodic airframe maintenance, during Phase II for seven Visconets in their queue line. No Visconet overhaul will

be done at LA during this phase because the planes will be too new to require it.
 Purpose of maintaining Visconets on the West Coast is to provide without need, look to keep the base to give pending the arrival of the 707s.

• **Phase III**—Begins with inauguration of the new 707 service scheduled for June, 1958. As the four Boeing airplanes arrive, Visconet maintenance will probably be transferred to Denver where the airline and repair overhaul will start as a passenger's base. Most 707 service and overhaul will be at the Los Angeles facility which will have expanded a 50,000-sq-ft to a 525,000-sq-ft plant with the addition of hangars and full overhaul equipment.

Gold & Silver

Continental officials say they will probably sell part of all of the DC-7B fleet as the Visconets are phased in unless passengers loads remain keeping them.

Continental officials and the airline's

own fleet of DC-7Bs. Visconets and 707s will enter as a new category of all-rack, overhaul and repair. High lights of CAL's plans:

- **DC-7Bs** will be loaded at Continental Club Coaches. Although changing only minor lines, the airline will provide such services as reserved seats, a In-seat Club Lounge, a separate comprehensive Shop Lounges for cigar and pipe smokers, but Continental Club coach offering the provision a selection of food, comfort, and reclining at mid-price cost. Two thousand will serve the passengers. Fleet's interest was quickly dropped by Douglas.

- **Visconets** first then will be called Golden Airways. Visconet will be Silver Airways. Continental's 52 passenger Visconet will feature an interior outlined by Charles Barker Associates industrial designers (AW Feb. 4 p. 51), who were the last to design a four-passenger lounge in the aft end of the cabin. The plane also will have fold-down steps and carry-on baggage racks to add passenger convenience.

- **Boeing 707s** will be labeled Golden Airways (its and will accommodate 136 passengers). Continental is planning to make high fares planes out of all jets, but has not yet decided who will be the lowest fares and lowest.

Devoted Deuts

Continental's Visconets will be the Model 512, equipped initially with Rolls-Royce R. 6s. 7-1/2 horsepower engine rated at 2,100 shp, with 3,100 shp. However, the Model 512 Visconet is not designed to handle the full horsepower of the R. 6s. 7-1/2 at takeoff due to a lack of directional control if an engine failed suddenly on takeoff resulting in structural damage. Therefore the R. 6s. 7-1/2 powerplants installed in CAL's Visconets will be derated to produce 1,900 shp at takeoff. But climb and cruise power available in this job will be equivalent to the normal 2,100 shp rating of the engine.

This will result in exceptionally good climb and cruise performance according to Continental officials. The R. 6s. 7-1/2 powerplants will be derated to produce 1,900 shp at takeoff. But climb and cruise power available in this job will be equivalent to the normal 2,100 shp rating of the engine.

• **Phase III**—Begins with inauguration of the new 707 service scheduled for June, 1958. As the four Boeing airplanes arrive, Visconet maintenance will probably be transferred to Denver where the airline and repair overhaul will start as a passenger's base. Most 707 service and overhaul will be at the Los Angeles facility which will have expanded a 50,000-sq-ft to a 525,000-sq-ft plant with the addition of hangars and full overhaul equipment.

• **Phase II**—Kicks off on about May 1, 1955 with beginning of Viscon service between Chicago and Los Angeles. First seven of the 15 Visconets CAL has on order (there is a contract for 5 more) will be put into service on this date.

The Los Angeles base will provide periodic airframe maintenance, during Phase II for seven Visconets in their queue line. No Visconet overhaul will be done at LA during this phase because the planes will be too new to require it.

Purpose of maintaining Visconets on the West Coast is to provide without need, look to keep the base to give pending the arrival of the 707s.

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Airlines List Executive Salaries For 1956 in Reports to CAB

Reports of officers and directors salaries for calendar year 1956 in filed with the Civil Aeronautics Board for the following airlines are:

American Airlines

C. E. Smith, president and director, 250,000; William A. Davis, senior vice president, 120,000; J. E. Smith, vice president and secretary, 80,000; G. W. Weaver, senior vice president, 60,000; and Director, 200,000.

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CONVAIR TC-119C-1 G-131 was last flying turboprop transport test bed used in MATS squadron.

Air Force Tests Turboprop Reliability

By Craig Lewis

San Antonio—Air Force testing of turboprop transports at Kelly Air Force Base is proving the reliability of U. S.-built turboprop engines on airline operations.

Tests conducted here with six flying test beds have ended the Air Force's development of the C-119 and C-119 programs. They also have been closely watched by airlines which will be operating turboprop transports within two years.

Military Air Transport Service Continental Division's turboprop test squadron has flown two of each of these modified transports in its tests.

- Convair TC-119C-1 C-131 (Convair 440) equipped with two 3,200-shp YT36 engines and Aeroconverters propellers.
- Boeing YC-97A KC-97C (Stratofreight) powered by four 3,000-shp Pratt & Whitney T34 engines and Curtiss-Wright Turbopropeller propellers.
- Lockheed TC-121B C-121 (Super Constellation) equipped with four T34 engines and Hamilton Standard turbo-Hydrocure propellers.

Completion Scheduled

Main purpose of the MATS test program has been to put in more hours on the various power plants in as short a time as possible. Tests on the TC-119C and YC-97A have been completed, and the TC-121B program is scheduled for completion in June.

The program began in September, 1954 when a handpicked group was assigned under command of Col. Claude W. Smith to 1700 Test Squadron (turboprops) under MATS' 1700 Air Transport Group. Smith has since moved up to command the parent 1700 Air Transport Group.

Looking back on the experiment which began in January, 1955 with the TC-119C, Col. Smith told Aviation Week the program "did much to validate the philosophy of the American built turboprop, thus perhaps one other thing."

Smith said the tests prove that turboprop transports would fit into MATS military relief operations, and he said he would like to see a similar program conducted on the Boeing 707, Douglas DC-8 types of transport.

Service testing of turboprop power began early in 1954 when the squadron assigned to TC-119Cs. Training programs were set up for flight and ground personnel, and 30 pilots and 24 engineers were checked out on the YC-97A.

In May, the squadron began operating the Convair over a regular airline pattern. Comparison of TC-119C performance with regular Convair 440 and 440 performance on various relief routes shows marked decreases in block time on both long and short haul segments.

Comparatively simple ground operation also contributed to the turboprop Convair's better schedule performance

and efficiency. In one test, the two aircraft were scheduled for a minimum 24-hour effort to determine turnaround capabilities. A utilization of 13 hours and 10 minutes was attained in the period, and crew changes, loading and other operations required less than 30 minutes between flights.

Tolerance performance for the YT36 powerplant, however, was found to be in line with predicted values, but the report on the project notes that the engines were highly affected by temperature in the amount of shaft horsepower available. Humidity effect was negligible.

Class Characteristics

The report said the transport's class characteristics are excellent and noted that climb to 36,000 ft. was completed without admission of any engine or propeller control, once climb power was set. Recovery of these characteristics, the group found that operation between 35,000 and 36,000 ft. is practical on comparatively short flights.

In single engine performance tests, the squadron found a maximum cruise speed of 115 knots can be maintained at 20,000 ft. with the aircraft at maximum gross weight.

Crew presentation was found a limiting factor on normal cruise operations between 25,000 and 30,000 ft., although aircraft performance was good. Aircraft and engine performance above 30,000 ft. was found "very satisfactory," but time required to climb to altitude



LOCKHEED TC-121B C-121 was delivered to MATS in 1956. Program will be completed in June.

would be too long to be practical if aircraft range is a primary consideration.

On impact operations, the report recommends use of a modified jet performance because of high fuel consumption rates at low altitudes. It was found that jet penetration from 20,000 ft. could be completed in eight to 11 minutes. Average time at Kelly AFB from high gear to touchdown was 12 minutes. Penetration was found both safe and practical, but penetration was a problem because rates of descent were too fast for passenger comfort.

Among recommendations in the TC-121B report was one calling for installation of an engine shifter in one source to allow automatic operation. Oper-

tions were limited during the test period because necessary starting units were not available at all airports.

Engine time between overhauls was calculated from 108 hours to 176 hours and then to 200 hours during the program. The squadron couldn't take the engine beyond the 200-hour mark, because they were using the YT36 prototype version, but it was actually good into the 600-hour range.

The YT36 powerplant required little maintenance between overhauls with the exception of the electronics, fuel solenoid. During the eight months of regular flight operations, the YC-121B required an average of 12.5 direct maintenance man-hours per flight hour. Of this total, the engines required 3.1 man-

hours and the propellers 4 man-hours.

At 200 hours between overhaul, seven engines were consumed per aircraft, not a total of 77. Two of the overhauls were for foreign object damage, two for starter disintegration and one each for bearing failure, excessive vibration, turbine vibration and excessive oil loss through oiler vents.

Costs

The YC-119C cost a total of \$169.93 per flight hour to operate. Total direct cost per hour was \$93.54, including \$37.05 for fuel, \$18.96 for crew and \$41.06 for maintenance.

The 1700 Test Squadron flew the two Convairs 5,517 hours before the program ended in December, 1955. Daily



BOEING YC-97A KC-97C was tested by MATS in transcon service, proved reliable.

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4 TORQ-SET affords simple loading rates. A one piece set adjusts easily to any type wrenching means — allowing close-to-hand operation for every fastening job.

5 TORQ-SET's unique wrenching means has driving ends that have a direct axis for driving. This permits power driving, at close quarters, tighter than any other fastener, yet TORQ-SET can be removed without deleterious effects including the power loss resistance type and is designed to allow extremely high maneuverability without bending or distortion — in any fastening job.

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LOCKHEED C-135 turboprop shown (left) alongside Super Constellation test bed, in Air Force's only production turboprop

operation increased from 44 hours in May to one later in November. Average utilization was 43 hours.

Second phase of the turboprop experiment began in September, 1955 when two VC-97s were delivered to the squadron. The turboprops were new KC-97C engines fitted with T-34 PS engines and Cetus Wright turboelectric props. The engines were installed with little structural change in the airframe.

Power Train

The new engine and propeller combination is fitted to power the Douglas C-135. With the engine mounted in the MATS tests, the C-135 will have a power train which has already been scheduled for 1,600 hours between overhauls.

After preliminary training and curve adaptation was complete, the squadron began testing the VC-97s to confirm manufacturers' performance data and determine the maintenance practices inherent in developing the.

Tests indicated that performance estimates were accurate within a margin of 15 percent. During these operations, the squadron found that most of the various USAF standards for establishing fuel reserve on the turboprop operation. The VC-97 is just slightly above the standards for turboprop operation.

As in the VC-119C, the VC-97 report recommends modification of power starting and an electrical power system. The report said that each test unit is in use, "engine starting will

mean the substantial problem in ground handling."

The program included tests to determine whether 180/130 grade fuel could be used in the T-34 when JP-3, 4 or 5 are not available. The 180/130 grade fuel was used for 26.5 hours with no apparent detrimental effects on the engine and fuel control, and very slight effects on performance.

To study the start characteristics of the T-34, an engine was shut down at 25,000 ft and allowed to cold soak for five hours and 40 minutes at an average temperature of -24 degrees centigrade. As an start was accomplished at 20,000 ft and -17 degrees, but the test indicated that special attention at acquired for post-landing and allowing the oil temperature to rise to operating limits.

Electrical System

The squadron found a need in the VC-97 for standby electrical power for the Cetus Wright prop in case of an electrical system failure. The aircraft was equipped with emergency battery for the prop.

After the group had tested the performance characteristics of the VC-97 in a program of operational flights, the aircraft was put in service on combat missions to test its reliability. The VC-97 was flown between Kelly AFB and Travis AFB, California. The report says that 30 scheduled missions were completed during October, 1955 with no delays attributable to engine or propeller and only two delays caused by other malfunctions.

MATS says that this kind of reliable



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FIG. 1

1 Back Gerotor elements are mounted externally to each other on the same shaft. This rotating permits stacking a number of elements of various sizes on the same shaft, in a common housing. By simply specifying shaft size with a specific construction and oil and discharge ports, several fluid systems may be served simultaneously and without cross-leakage (See Fig. 2). Different capacities can be provided for each system despite the common drive shaft speed by varying the diameter or thickness of the Gerotor elements to vary the volume of the tooth chamber.



FIG. 2

2 Interconnected systems such as lubrication, instrumentation, low pressure hydraulic servo systems and motors up to pressures of about 1000 psi may be controlled in one manner and multiple pump installations avoided.

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they proved the rule rather than the exception throughout the service test program, and it indicates the reliability of telescopes and the advantage of automatic remote maintenance support required for engine and propeller.

This record is in direct contrast to the piston powered C-97, according to the report. MATS believes that schedule reliability of telescope aircraft would be 100% as very close to it.

In January, 1956, the squadron tried the YC-97J in transport operations. The first flight was made between Kelly and Hahn Air Force Bases, Germany. It was completed without maintenance problems of any kind, and the report states the performance of aircraft, engine and propeller was outstanding.

On a subsequent trip to Tokyo, two propeller assemblies failed, delaying the flight because replacement parts had to be flown from the U.S. With normal supply conditions, the maintenance could have been corrected in minutes without appreciable flight delay.

These two emergency missions concerned the MATS squadron the YC-97J could be used for regular cargo carrying missions. In April, a schedule was established between Kelly and Hahn Air Force Bases via Charleston, S. C. and returning to Kelly via Honolulu, AFB. Two flights a week were flown over this route, carrying cargo between the U.S. and Puerto Rico.

The YC-97J was capable of delivering a load over the 1,500 mile route between Charleston and Hahn in less than 15 minutes. On a flight to Bermuda at the end of 1955, the YC-97J flew the 4,200 mile round trip in 11 hours and 55 minutes at an average ground speed of 392 mph.

Schedule Reliability

These performance, plus late flights in the U.S. and over the North Atlantic convinced the MATS group that when ground support of the telescope becomes comparable to that currently available to piston transports, "the schedule reliability will be equal to that of current heavy transports of relative power and capacity."

In a survey of aircraft commanders in the squadron, 91% of them felt the reliability of the T34 was good, and 97% considered it fair. Propeller reliability was considered good by 58% and fair by 12%.

In its report, the MATS group found that the C-47 aircraft provided a non-scheduled and flexible test bed for the T34.

Some superficial engine damage was found due to the increased power, but the basic structure remained sound.

Telescope failures on the T34 were

the biggest maintenance headache. Constant telescope working required the quiet type. The tests also indicated that other modifications using engine bleed air should be avoided unless provisions are made to blow contaminants out and to bypass field filters in flight.

The MATS report concluded that the T34 engine has proven reliable and dependable and has a future role consistent with today's standards of reliability.

Field and organizational maintenance was found uncomplicated and responsive.

These main deficiencies found were heavy breathing, turbine bearing seal

leaks and fuel control malfunctions. Engineering changes are expected to correct these problems.

When the YC-97J was first received by MATS, the time between overhaul on the T34 engine was 110 hours. In 15 months this time was increased to 1,250 hours. Close cooperation between the manufacturer, an Air Force Command headquarters, San Antonio Air Materiel Area and the test squadron in a combined with the rapid progress in extending engine life. Engine life expectancy at the 1,500 hour minimum test level was 79%.

At the beginning of the program, propeller inspection was required at



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100 hours. This was subsequently extended to 300 hours. SAAMA personnel handled inspections and minor repairs, and Carter-Wright did 500 and 1,000 hour overhauls on the pumps.

Numerous deficiencies were found in the props at the beginning of the program, but they were corrected through engineering changes and new maintenance and assembly procedures.

Report found the Curtiss-Wright props have designs sound and without any noticeable deficiencies which would preclude its use on military or commercial turbo-prop transports. Trend of reliability has improved with experience.

Personal Statement

MATS found that there is a shortage of trained USAF personnel for turboprop aircraft and that a training program of a greater scope than was originally planned is required to provide adequate maintenance for turboprop aircraft. Until the new skills are developed, MATS says wide representation (broad-based representation) is likely to be necessary.

Statistics on the YC-97J program show that the aircraft required an average of 19.4 direct maintenance man-hours per flying hour. Of the total, 6.1 hours went for engine work, and 1.4 hours for propellers. When the program officially ended last November, the two YC-97Js had flown 1,246 hours in 11.5 months with an average daily utilization of 5.4 hours.

The two Borings have been transferred from MATS for a comprehensive IRAN program to determine what effect the nuclear engine had on the aircraft. First reports indicate the airplanes are in as good or better condition than those of comparable piston transports.

The last phase of the railprop test program is now drawing to a close as the June deadline nears for the YC-121F project. The test squadron plans to put 4,000 hours on the two Lockheed transports before the deadline.

MATS Delivery

The YC-111F was delivered to the MAYS group early in 1956. It was necessary to redesign the propeller pump bearing early in the program, and the downtime delayed the test program. But the YC-111F program had the initial advantage of the experience gained in the YC-971 tests. YC-111F has T94-P6 engines, but the differences are largely confined to adoption of the Hamilton Standard propeller to the engine.

At the start of the YC-121F program, the squadron took the engines to 100 hours to test the modifications.

ROCKET POWER PROGRESS REPORT

Tailoring Molecules *for* Rockets

by Dr. David E. Lammiman



A member of the Chemistry Department Staff at Eastman Kodak, Inc., Dr. Lippman specializes in combination processes and theoretical analysis. He received his B. S. and M. A. in Chemistry at the University of Wisconsin and his Ph. D. in Physical Chemistry at the University of California at Berkeley. He has been with RMI for three years.

The practical failure of rocket power depends upon a great many factors—but the least of which is the solution of the problems facing the rocket propellant chemist. The criteria for rocket chemicals—whether solid, liquid (monomer or prepropellant), hybrid or the new "modular" chemicals—must be within the limited parameters of certain rigid requirements. This discussion deals with some of those basic considerations which influence the chemist's search for improved high energy rocket propellants.

The conventional rocket motor is a heat engine which converts the chemical energy of propellants into heat and the heat into kinetic energy. Fresh air is drawn in the combustion chamber of the rocket motor, allowing the propellant to react, producing products, which expand through a nozzle, to produce a jet of gas. The products of their heat energy are kinetic energy. The gases, now moving at high velocity, are collected by the rear and by the reaction principle they exert a forward force, measured in pounds of thrust, to the motor.

The thrust exerted by a rocket motor is proportional to the exhaust velocity of the reaction products. To produce a high exhaust velocity, the reaction of the propellants must yield a large quantity of heat per unit mass and the heat must be converted into kinetic energy efficiently.

The least pronounced is the difference between the heat of formation of the propellants and the heat of formation of the reaction products as the propellants should have large positive heats of formation, and give products with large negative heats of formation. Because of the requirement for large heat of reaction per unit mass (not per mole), only the lightest elements are used in propellants. The most desirable elements are hydrogen, helium, beryllium, boron, carbon, nitrogen, oxygen, fluorine, magnesium, sodium, and silicon, elements heavier than chlorine are rarely used. The heat of formation of propellants is measured by incorporating high energy groups such as $-CH_3$, $-NH_2$, and $-CO-$ into the propellant molecule.

The efficiency of conversion of heat into kinetic energy is inversely proportional to the mean molecular weight of the reaction products. Therefore propellants are designed to give light products, such as H_2 , He , and CO .

These three requirements, i.e., that the propellants have large positive heats of formation, that the products of reaction have large negative heats of formation, and that the products have low molecular weights, cannot all be optimized simultaneously. A good propellant must have an optimum balance among them. In addition, a propellant should have other desirable properties, such as stability and high density.

The chemistry department at RMIT, a part of the applied research, development and production of solid and liquid power systems, are staffed with a team of specialists, highly qualified in many phases of chemistry and chemical engineering. This team is constantly working toward the achievement of this optimum balance of properties in their search for advanced rocket propellants. The well-planned program of research, analysis and evaluation which contributes to this goal involves such typical activities as mathematical analysis, theoretical chemistry, analytical chemistry, combustion chemistry, spectral and inorganic synthesis, physical properties, and systems, with special attention devoted to solid and liquid rocket research.

If you desire one or more reprints of Dr. Lippman's article, or would like to receive additional information about RMI, write to our Information Services Coordinator, Reaction Motors, Inc., 14 First Road, Denville, New Jersey.

Power for β_1 Progress



IN AMIAN WATERS—Aboard the U. S. Navy aircraft carrier Bore off the coast of Japan, seven-equipped Sikorsky HO4S helicopters carry out anti-submarine

exercises. The commercial version of this helicopter, the S-58, is active offshore in the Gulf of Mexico flying sand, and material to oil drilling rigs.

AROUND THE WORLD WITH SIKORSKY HELICOPTERS



ANTARCTIC OPERATIONS prove the ability of versatile Sikorsky helicopters to work under extremes of climate and under unusually difficult maintenance conditions. Here a Sikorsky HO4S, one of four with Task Force 42, lands beside the icebreaker Glacier to pick up cargo.



AT FORT RUCKER, Alabama, the Sikorsky H-35A is being service tested by the U. S. Army Aviation Board. Data on maintenance and logistics will be gathered, in preparation for the time when the Army has large fleets of these twin-engine helicopters, each able to carry 20 combat-ready troops.



HELICOPTER HISTORY



FIRST DELIVERY FLIGHT

In May, 1942, the pioneering Sikorsky HO-4 arrived at Wright Field. Then, after its baptism 761-mile delivery flight from Bridgeport, Conn., piloted by C. L. "Red" Morris. The HO-4 became the last helicopter to see service in World War II. It accumulated 50,000 hours before being superseded by later types.

BRUSSELS TO PARIS HELICOPTER SERVICE—With its new fleet of 12 passenger Sikorsky S-58s, SARLINA Belgian World Airlines this spring inaugurates passenger service between Brussels and the center of Paris, close to the Eiffel Tower. The big, versatile S-58s are already flying on SARLINA's other helicopter routes in Europe. In the New York metropolitan area, S-58 passenger service is also being operated by New York Airways.



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Canada to Obtain Air Homing Torpedo

Ottawa-Based Canadian Air Force and the Royal Canadian Navy will this year be equipped with new air to water homing torpedoes to meet the Russian submarine threat, according to a report released by the Canadian Department of National Defense at Ottawa in the

Canadian House of Commons.

Report emphasizes that Canada must be able to defend itself against atomic missiles launched from submarines lying off its coast.

The report specifically refers to the development of Canada's submarine fleet and the necessity of providing adequate anti-submarine defenses. It points out that "the developing ability of ships and submarines to launch guided missiles has been of concern to the Royal Canadian Navy and RCAF ever since the war, not from the east coast of Nova Scotia in relation to the need for intercepting and outwading the range of our anti-submarine effectiveness."

Steps which the Canadians have



LAUNCHER BALLISTIC MISSILE, called for firing on the launching dock of the Long-Hydrographic ship missile submarine, is shown in the artist's conception.

test of large forces are incorporated into what is actually a multi-purpose testing device and device launcher.

In range function is to determine the loading conditions under which a missile can safely be launched from a moving platform without interference from the platform. In this phase, factors to be studied include crew safety, operation of the launching mechanism, functioning of the missile's powerplant, guidance controls under dynamic conditions.

Simulator is designed to duplicate the periodic roll and pitch of a ship while simultaneously reproducing the force motion. Four channels as yet will guide the current research. Important requirement of the device is that it be capable of maintaining the motion despite massive changes in weight and force which occur as missile is launched.

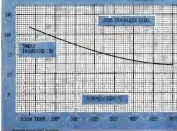
The simulator, through electronic synchronization equipment, can reproduce actual ship motions from tape recordings made at sea. This permits operational studies to be made of



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Fatigue tests of 180 test 300 hours per minute can be applied to the Harland Comet now generally by sections developed by de Havilland with Boeing of Alford, E. Canada & Co. Machines for tests in constant stress for first years giving components for the jet motor part. Machine is built of its type in Britain, and America, but it has been available to other aircraft manufacturers. Components and sections of Comet 4 fuselage, type or other by Capital Airlines, are tested in its own for expected life in commercial operation. Later, complete fuselage will be tested.

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takes to contract the submarine may use are contained in the report, and include a four-year program of major equipment modernization on naval ships, production of the new nuclear-powered ballistic missile, the new August C-128 reconnaissance aircraft (being built by Canadair Ltd., Montreal), a Canadian-developed air transport and tactical control system known as AN-TAC installed on the August aircraft, delivery of the new missile carrier Sea-Invader which goes into service soon, and of Canadian S-117 Tracker anti-submarine aircraft (being built at the Harland Aircraft, Ltd., Toronto), and use of helicopters from frigates for submarine spotting.

RCAP strength is given as 10-140 at sea and 100-150 at land.

The report states that the main RCAP home defense squadron will be equipped with CF-100 Mark V fighters by the end of this year, and that the CF-100 Mark VI will soon be coming into service.

This new model of the first jet Avro Aircraft of Canada, Ltd., Toronto, all-weather fighters, will be fitted with afterburners. The aircraft will be engaged for attacking Sparrow missile launchers which are being purchased by the United States and will later be produced in Canada.

Canada was to have added three more home defense interceptor squadrons to its strength, but instead is training 160 pilots at the West Canadian Air Force at the Sabre fighter, of which Canada has bought 225 from Canada.

The West Canadian training program is to take 15 months, was started late in 1956. After that the three new RCAP squadrons will be formed for home defense. Those squadrons can then, in 1959, be equipped with the new Avro CF-100 Avro jet-powered all-weather fighter now under development in Canada.

Australia Will Keep Own Aircraft Industry

Melbourne-Australia's federal government will preserve Australian aircraft manufacturing. It will avoid reliance in Melbourne's fighter built under American license with American assistance.

Australia is expected to import from U.S. large numbers of parts, perhaps auxiliary engines, and other jets and engines. American experts also are to come to Australia.

Government is hopeful of developing aviation export market to SEATO members.

RAF still insisting on F-104 as a fighter. An Australian request will arrive in the U.S. next month to finalize production details.

Sandys Promises Slow Missile Changeover

London-British Defense Minister Dennis Sandys, at the time of a rising tide of criticism that he is slowing the process, emphasized that the introduction of guided weapons for nuclear fighters and V bombers will be gradual extending over a number of years.

Even then, there will still remain a very wide range of rates for which manned aircraft will still be needed," he told the House of Commons. Sandys said fighters and V bombers "which develop some of which they are capable will be highly effective for some years to come."

The Defense Minister and more action for British Britannia are in the offing to build a fleet of jet and turbo-prop transports to be added as well as the Coastal Recon force by 1960.

"The Britannia is a splendid aircraft, which is already equal for long distance trans-oceanic," he reported. "The government attaches great importance to the stability of the Royal Air Force and I assure the House that such further Britannia as may be necessary for this purpose will be ordered."

An opposition spokesman charged that what the government calls a "fleet" of Transport Command aircraft consists in fact of only a handful of Canberras, Beavers and Hastings.

"The Beavert's cargo and life is very much open to question as compared with its American counterpart," he said. "But even so, they are coming off the line so slowly that they will not be very relevant for a long time to come."

He suggested that the Ministry of Supply turn some of the Beavert's use to some of the large contractors whom work is being cut back under the new program.

"In fact one of our problems that Blackburn is not making this sort of use of free to do this in the two regions," he asked.

The opposition also charged that the government was planning to cut back the V-bomber force long before guided weapons such as the Thor could be available for Britain. There also were accusations that Britain was taking in its various commitments to NATO.

Sandys was also under attack, out of Parliament for some of the changes he has proposed. The Society of British Aircraft Constructors raised the question whether the changeover to guided weapons was being anticipated too slowly.

Members of the RAF SE Jutland Squadron declared that Britain should wait until



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an effective ground-to-air missile is ready for service before falling about the misused fighter being obsolete. He added: "The misused bomber will, of course, be supplemented by missiles, but I cannot foresee the day when medium and light bombers cease to flow as a significant part of the first line of America's Command, as well as our overseas air forces."

Missiles For NATO Ease Europe Fear

Fast-Expected U. S. announcement that three types of missile—Banshee, Jolly, Matador and Nike—will be included in recent U. S. Mutual Aid Program for NATO countries has eased stress put on NATO by British White Paper on defense.

U. S. action, an outgrowth of NATO Council meeting last December when Defense Secretary Wilson promised NATO nations U. S. assistance and, less quickly than expected by certain European nations, over British withdrawal from central Europe. NATO announcement of U. S. action was carefully worded and made the point of stress that the missiles are being provided "with the whole-hearted intent of protecting nations and populations from air and to deter and if need be to repel aggression."

Robert Johns and Matador are ground-to-ground missiles and Nike is a ground-to-air missile. Whether NATO nations will get latest versions of these missiles was not settled though in former NATO quarters last latest version would be supplied.

Weapons will be paid for out of Fiscal 1957 funds though deliveries probably will not begin until the following year.

NATO announcement also did not reveal which NATO nations would get the missiles. The advanced weapons have been tentatively allocated to certain NATO nations based upon the guidelines of NATO military aid program. The U. S. NATO representatives has made it clear that these decisions would remain tentative — pending discussion on measures necessary to satisfactory absorption of the missiles as the recipient countries' needs. "Nuclear component for the missiles are not needed."

Few Germans Pass Physicals for Flight

Bonn—Only 25% of the first 1,800 Germans to take applicants for flight physicals fit as pilots, according to a Hawkeye psychologist, Dr. Schwenker. He also reported that only 35% of 31 Luftwaffe applicants tested during the last two years were fit for flying.



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What is Flexflyte?

A lightweight, reinforced ducting made of a spring steel wire braid covered with enamel fiber glass or a custom fabric and bonded with a fiber glass resin.

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Vickers 200 cc Hydraulic Pump. This pump is used to provide the hydraulic power for the engine in response to the pressure in fluid which the fuel line can produce.



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Remote Package for Accessories Favored

Grouping aircraft and engine accessories in a remotely located package is a trend for high Mach number airplanes installed on large (100,000 lb.), multi-engine aircraft. This concept will allow the powerplant to perform most efficiently in power-hungry-propeller use.

This is the opinion expressed by J. D. Delano, Aircraft Gas Turbine Division, General Electric Co. He added that in the future this concept may be extended to have one remotely located accessory grouping performing accessory functions for several engines and driven by one of the more advanced types of transmission.

Delano suggests putting all aircraft and engine accessories off the powerplant, packaging them, and storing them in the wing directly above the fuel support tank.

Accessory drive would run from a single power island on the top of the engine, vertically up through the vent, to the package.

Wing 13 in. thick would be sufficiently deep to accommodate the accessory package, according to Delano. This should not be difficult to achieve in a 300,000 lb. plane.

He cites three advantages which result from locating accessories remotely.

• Weight reduction due to lighter start construction resulting from removal of about 1,000 lb. of turbine accessories from each pod and deletion of reduction. Approximately 50 lb. per engine is saved.

• Drag reduction due to better frontal area by about 1.9 sq. ft. per pod will give a significant saving in fuel consumption.

• Maintenance will be simplified because engine will always be stripped of accessories. Engine changes will be easier because power is due to accessory failure. Engine disassembly will be easier since a lot of interfering bits and components will have been eliminated.

Accessories will be readily accessible from above and below in their wing location.

Production of engines will be simplified since different models of the same engine will not have to be produced to provide for various accessory pod locations. Only a single power island is required.

Logistics will be similarly simplified by standardizing on a single model of an engine.

• Fuel hazard is reduced because many possible sources of leakage or rupture of fuel containing combustible liquids are greatly reduced.



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SYNCHRO TYPE	SERIAL	RANGE AT PRESENT				STATION AT PRESENT				RANGE AT PRESENT				ANTICIPATED			
		1000	2000	3000	4000	1000	2000	3000	4000	1000	2000	3000	4000	1000	2000	3000	4000
Clifton Precision	CP-100	100	200	300	400	100	200	300	400	100	200	300	400	100	200	300	400
Clifton Precision	CP-200	100	200	300	400	100	200	300	400	100	200	300	400	100	200	300	400
Clifton Precision	CP-300	100	200	300	400	100	200	300	400	100	200	300	400	100	200	300	400
Clifton Precision	CP-400	100	200	300	400	100	200	300	400	100	200	300	400	100	200	300	400
Clifton Precision	CP-500	100	200	300	400	100	200	300	400	100	200	300	400	100	200	300	400
Clifton Precision	CP-600	100	200	300	400	100	200	300	400	100	200	300	400	100	200	300	400
Clifton Precision	CP-700	100	200	300	400	100	200	300	400	100	200	300	400	100	200	300	400
Clifton Precision	CP-800	100	200	300	400	100	200	300	400	100	200	300	400	100	200	300	400
Clifton Precision	CP-900	100	200	300	400	100	200	300	400	100	200	300	400	100	200	300	400
Clifton Precision	CP-1000	100	200	300	400	100	200	300	400	100	200	300	400	100	200	300	400



Avionics "Erector Set"

Avionics equipment modules can be constructed in variety of configurations using one or more of 75 mass-produced building block metal cabinet enclosures and 125 different sub-units, a line of which are shown above. Aerospace-type construction is used in standard frames. Manufacturer Elgin Metalhousing Corp., 650 Congdon Ave., Elgin, Ill.

ery among the more useful surfaces, should have sufficient capacity to discharge a large amount, Tanager behaves

Theory of Operation

Tanager used the new technique is added from basic studies into the nature of the negative-point corner discharge, the nature of radio noise, and the mechanism by which the discharge once is coupled into the radio receiver antenna.

These studies showed that radio noise is very, good radio frequency coupling between antenna and radio antenna of the same phase, on the antenna being, not constructed that antenna usually serves. (See sketch, page 73, left). This means that there is a suitable medium for transferring corner discharge noise into the antenna.

If, however, the trailing edge is electrically isolated from the rest of the tail or wing there are two points on the induced antenna where the coupling, or RF field, is zero. (See sketch, page 73, right).

If the corner discharge can be made to occur at these points of zero RF coupling, little or no energy will be transferred to the antenna in producing preponderant static in the receiver, Tanager told the IRE.

De-Coupled Discharges

The tray shape discharges themselves are mounted along the line of maximum RF coupling, a position that can be determined by electrolytic tank field mapping techniques, Tanager indicated.

However, the trailing edge cannot be completely isolated from the antenna inasmuch as the accumulated charge must have an electrical path back to the discharges. This is accomplished by using a light, conducting Fiberglas or one coated with a resistance film to

produce a distributed resistance. If the resistance is sufficiently high compared to the resistance represented by the capacitance between the isolated conductors and main antenna, the former will appear to be electrically isolated as far as the RF field is concerned, yet will permit passage of the antenna charge, Tanager said.

To insure that discharge will take place at the desired points, the trailing edge of the wing must have a series of resistance that is substantially greater than that of the discharge points, Tanager continued.

Representative of a major aircraft company, who attended the IRE session, later told Avionics Week that the new static discharge looks promising. However, he added that it is an all-weather aircraft might be limited by the lack of plastic isolating materials with high structural strength at elevated temperatures.

Avionics Conference Tries Experiment

A novel experiment in conducting technical conferences will be tried at the Conference on Associated Electronic Systems to be held in Dayton, Ohio, May 13-15.

Instead of the customary 20 minutes allotted for delivery of each paper, speakers have been asked to limit their talks to a 10-minute monologue which will be followed by 10 minutes of questions and discussion from the floor. Copies of the technical papers will be distributed at the beginning of the conference so that speakers can devote their time to highlights rather than details.

Positive attendance of the conference will be a partial focus on this subject. "Wanted—New Ideas in Avionics Electronics."

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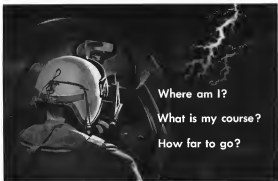
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FLIGHT INDICATOR of this system displays ground track, required course, heading error, and distance to the destination.



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house? Panel members will include Dr. George I. Heller, general manager of General Electric's Defense Electronics division; Pauline John E. Arnold of Massachusetts Institute of Technology; Lt. General T. S. Power, Commander of the USAF's Air Research and Development Command; H. E. Hoffman, president of Holloman Electronics Corp.; Dr. Robert D. Thomas, director of the Battelle Memorial Institute; and Rear Admiral Lawrence E. Bennett, Chief of the Office of Naval Research.

Some of the 85 technical papers slated for presentation at the conference include:

- Vacuum Tubes for 500°C Envelope Temperature and High Vibration Applications, by John W. Wyman of Bendix Aviation.
- The Amplifier, A New Type Microwave Amplifier Tube for High Power, Broad Band Equipment Applications, by William C. Brown, Raytheon Manufacturing Co.
- Inertial Navigation Performance Characteristics, by Robert W. Widen of Minneapolis-Honeywell.
- An Airborne Atomic Frequency Standard, by J. J. Bagnall and J. H. Holloway, National Co.
- Some Aspects of Digital Transmission of Data, by Seymour Roger, Air Force Cambridge Research Center.
- Integration of Core and Equipment Coding in Supersonic Bomber Design, by A. E. Holman, Boeing Aerospace Co.
- Operational Requirements for Data Link, Milton W. Anzick, Air Transport Assoc.

The latter is one of the papers to be given at a session devoted to Air Safety. Jerome Lohrman of the Flight Safety Foundation also will speak on The Challenge of Air Safety.

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see also: Newark, Inc., 2723 So. Clearview Ave., Los Angeles 64, Calif.

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Can We Afford a \$71.8 Billion Budget?

THE BUDGET submitted to Congress by President Eisenhower for the year beginning July 1 proposes federal spending of \$71.8 billion. In only four years, three during World War II and one during the Korean War, has the government spent more. Under the proposed budget the government expects to collect \$73.6 billion, mostly through individual and corporation income taxes.

The principal reason for the size of the budget and for this year's increase is an expanding defense program. About 60% of all budget expenditures in the coming fiscal year will be for national security programs. Moreover, this area accounts for about 90% of the proposed increase in federal spending. In addition, as the chart shows, there are large expenditures proposed for purposes other than defense.

Continued budgets of this size, some contend, will lead to inflation and wreck our economy. It has been suggested that they might lead to "a depression that will end your hair." Yet many insist that the budget, large as it is, still is inadequate in many respects — for defense, schools, agriculture, small business, health, research, indeed, for almost every activity in which the government has become involved.

Is It Really Too Big?

Actually, the proposed budget would place no greater burden on the economy than any budget in the last six years, because our economy has been growing. Federal spending per capita under the proposed

(These figures refer to the regular federal budget and do not include operations of trust funds, primarily for social security programs and the new federal aid program for highways, which are financed by special taxes.)

budget will be about \$416, or \$10 more than this year; but our per capita income rose almost \$80 last year. And, because of our increasing population, next year's expenditures will, in fact, amount to less per capita than in 1954 when federal spending was \$4 billion lower.

Another way of measuring the burden of government expenditures on the economy is to compare the purchases of goods and services of all branches of government — federal, state and local — with the total output of the nation. The share of our national product taken by government this year will be about the same as in the past two years and, furthermore, about the same as the average for the past 38 years.

By the standard of any recent year, the budget is within the means of the American economy. In this sense, we can "afford" it. But the pro-

FEDERAL BUDGET EXPENDITURES



*Rounded to first four digits after decimal.

pect of steadily increasing budgets, requiring 20% or more of our national income, introduces another threat.

The Real Threat

Large and rising budgets that do not balance government spending with higher tax collections clearly would be inflationary and would destroy the value of the savings and income of all who lagged in the race with climbing prices. But serious dangers will still exist even if our budget continues to be balanced, as this year's is.

● **Budgets that require a large take in taxes eat up the savings required to finance private industry.** What the taxpayers must give the government they cannot earn. This deprives private industry of the savings and resources needed to expand and modernize producing facilities.

● **High tax rates also undermine the incentive to save and invest in normal business enterprises by taking such a large share of any income gained.** Taxes on corporation income now take 52% of all income over \$25,000. And taxes on individual incomes can take as much as 90% of earnings that remain after this 52% bite.

● **High taxes encourage, on the part of both individuals and corporations, the search for "gimmicks" and special treatment.** As a leading character in Thornton Wilder's novel *Executive Suite* observed: "To a far greater degree than most people realize, income tax has become a primary governing factor in corporation management." Indeed, it is only because of the numerous gimmicks and special provisions now available that high tax rates have not already inflicted greater damage to economic incentives.

These dangers comprise the real threat of large and rising federal budgets. It is a threat to continued growth of our economy, and it is no less a threat merely because the budget is technically in balance.

What Should Be Done?

In attempting to hold government spending within reasonable bounds, we should not hold back on needed civilian programs. The heavy

demands now being urged at all levels of government for roads and schools, for instance, are largely the result of failure to keep pace with the growth of the country. Furthermore, we cannot cut provisions for national security below the minimum level of safety. And, notwithstanding the rocket and missile age is factually and ever increasingly expensive.

What we can do is enforce some financial discipline on our military leaders, and hold down our defense expenditures by making sure their demands are justified and by requiring efficiency. In the civilian programs, though some need to be increased to serve a growing economy, we can eliminate the outright waste.

A More Difficult Job

We must also do something far more difficult, and that is to reduce federal programs of aid to special groups at the expense of all the taxpayers. The new budget calls for over \$5 billion for veterans, and another \$5 billion for farmers. A number of industries and areas stand to receive aid in large amounts based less on necessity than on political pressure. These demands for increased aid, year after year, must be resisted if we are to have any hope of stopping a relentless rise in our budget.

Thus, as our national income increases, we can look forward to reducing tax rates and providing greater incentives for the private sector of the economy. Only in this way — by keeping government spending in line with economic growth — can we prevent our federal budget from being a crippling burden.

This message is one of a series prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nation-wide developments. Permission is freely extended in newspapers, groups or individuals to quote or reprint all or parts of the text.

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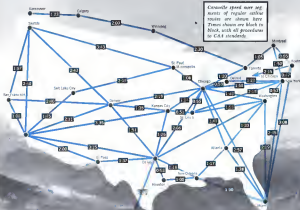
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ICBM Clouds Future of Open Skies Plan

By Robert Cochrane

Aerial photo-reconnaissance disarmament inspections as proposed by President Eisenhower in his Open Skies formula will face a serious technological setback if delayed until after the advent of the operational ICBM.

This warning has come from both advisors to the President and from photo reconnaissance experts before the Senate Subcommittee on Disarmament.

"With underground (ICBM) remote surveillance the problem of search may well become analogous to the location of a mole's hole in a cave, concealed at that," one expert said.

There have been indications lately that disarmament talks with Russia have been making progress and that some form of agreement may be at hand—possibly a limited Open Skies.

Some U. S. nationalists previously held the opinion that ICBM launching sites would be very difficult to conceal. The main reason behind this view was the difficulty in disposing blast and keeping back pressure low in an underground installation during firing.

Russian work, however, has markedly improved venting systems and launching techniques and these same manufacturers now consider underground launching to be feasible.

Harold Stassen, presidential adviser on disarmament, has said, "The heart of the (Open Skies) proposal is unrestricted but restricted, reciprocal aerial inspection, by visual, photographic and electronic means." Electronic could refer to either radar or infrared.

Designing techniques for aerial inspection is the responsibility of an eight arms White House task force headed by Gen. James H. Doolittle. The task force has given no indication of its progress, but often in the photo-reconnaissance field has made progress.

A flight to aerial map the U. S. S. R. in 76 days was developed by Detachment W-10, USAF (R&T), now with the photographic section of Ballistic Watch Co.'s Research and Development Laboratories, Woodbridge, N. Y.

Goldfied proposed that 40 RB-57s be used to fly almost in a line 25 mi apart to map 1,000 mi wide stretches of Russia. Coverage would overlap for later examination. The RB-57s would fly North-South and work these daily strips West to East so that they could follow good weather with high pressure cells.

Map shows the line or an arc across which would be covered by such a flight. The RB-57s would fly at 40,000-45,000 ft. These 74 deg. angle courses, in-



"Well, it's ready for open sky inspection."

REARVIEW BY MICHAEL HICKEL, © 1957 THE NEW YORKER MAGAZINE, INC.

tercepted trajectories, would cover locations in Russia. As the heart of the reconnaissance formation (about 1/2 90), outer courses would overlap the corresponding area covered by the neighboring planes and also take in the horizon as an orientation check against the accuracy of the previous course.

Using precise navigational aids (perhaps eventually demanding new tech support and special purpose ground beacons), the RB-57s could proceed in a straight line, using coverage so that one's path would fit into the overall course with a minimum of adjustment.

In addition to stand-by camera groups at the sites of interest, at least 24 more RB-57s would have to fly with the formation to replace malfunctioning air-

craft as no gaps would occur in the mission.

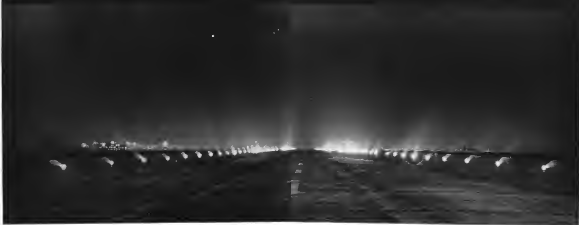
Just past over USSR, each aircraft, according to charts and military blueprints. Areas of "interest" would be located and as a result a tighter plan of operations for succeeding flights and dispatch of ground inspection could be formulated.

According to Stassen, the RB-57s might carry a USSR liaison officer aboard. Also, they might use Russian aircraft. However, the B-52 (or the B-36, which is another idea) Senator Swington's staff has suggested be used to convey SAC strength, with refueling, could operate directly from our overseas bases.

The irregular Soviet outline and the (unpredictable) gaudy shape of the

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MAP OF U.S.S.R. has been devoted into the North-South quadrant for a week's aerial reconnaissance mission. Although U.S. aircraft would undoubtedly have seen of U.S.S.R. activity, it would be possible to accomplish job from U.S. aircraft bases.

USAF Air Charming and Information Center, St. Louis, Mo., Goddard said.

Interceptors would peer the photos together and check the findings against what was disclosed in the Russian military literature. If points of special interest or considerations should show up, reliable ground observers would be dispatched on unannounced inspection visits to make spot checks.

Here, Gervett, also of Belva and with ground experience at the photo-reconnaissance laboratory of Boston University, said that data reduction would be more of a problem than the focus, but it still within present capabilities. Improvements of specialized equipment could speed the process.

If a full scale mapping job of U.S.S.R. were contemplated, it would take about 60,000 9 in. x 9 in. prints from the center or vertical camera. These would be passed together to form a mosaic 400 ft. long in the East-West direction and about 110 ft. high North-South.

Coddard and Gervett emphasized

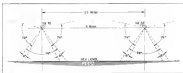
that exact figures are not as important as the fact that we do have the capability of performing the mission and that when accomplished, answers can be verified from photographs taken at right angle altitudes.

For an organized Open Skies program, Gervett believes a new non-military department agency should be established solely to perform this important mission. The agency would be charged to specialize on limited areas of U.S.S.R. so that any changes would have a minimum chance of being detected.

Gestalt Method

These regional reports, said Gervett, would be well selected in the art of Gestalt interpretation. This is the final stage, that requires involved appearing objects are not related their antecedents, when comparatively analyzed as an overall picture.

If, in a previously known terms, some new ideas appear in a related context



READ-ON diagram of photo-reconnaissance function illustrates how two 74° beams would be spread relative to each other. The vertical of the three 74° camera cones would directly below and the other two cones come down. In the given coverage direction shown, the vertical camera would not overlap. However, in a mapping run, the 74° beams would fit close together so that vertical camera would overlap for mosaic.

try, some careful consideration would be called for. When dispatching a work plane equipped with infrared detection, it is found that the area between those "beams" is somewhat warmer than the rest of the terrain, then it is likely that the aircraft could with assistance dispatch a ground observer to look for hidden underground activity.

Aerialist aerial photo-reconnaissance expert, Dr. E. Macdonald, director of the graduate school and professor of physics, Boston University, discussed feasibility of Open Skies before the Senate's Subcommittee on Documentation. Macdonald is a past director of the Technical Research Laboratory of the University which specializes in aerial reconnaissance, and is a member of the Scientific Advisory Board of the Chief of Staff USAF and an aerial reconnaissance consultant to the Rand Corp., Santa Monica, Calif.

Inspection Function

The function of aerial inspection may be roughly summed," he told the Subcommittee. "Given a 9 million sq. mi. (U.S.S.R.), 300 flight hours providing about 100,000 photographs can provide total cover. This conclusion is based upon the assumption of a single resolution of recent standard equipment. A state complex variable and as new tools would markedly reduce the flight hour requirements.

The cover could yield positive information in the area of activity and areas of non-activity. Of the area of activity, a large number could be successfully analyzed to define the nature of the activity and the resources would be needed for a state defense concept.

"This cover, we would estimate, would require 200,000 additional photographs. Thus, then, the nature and as volume of production and assessment would be almost completely assessed. Above existing photographic ground inspection could be progressed."

On subsequent camera, Macdonald said, the total war maps to locate new facilities would require much lower frequency of repetition than the closing nature of the selected areas of activity."

Under the technical problems facing complete aerial inspection are relatively easy, Macdonald said. Aerial reconnaissance at least is adequate for the job. One of the problems of the number of trained photomicroscopists available, the development of suitable technological support staff and perhaps some changes in basic philosophy underlying equipment related to the photo-reconnaissance process would seem to appear as unique to the technological aspects of an open aerial inspection program. Construction from present equipment in proposed mobile systems is also subject to sample aerial inspection, identification,

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GE Runs High Temperature Blade Test

Milwaukee turbine blades present a General Electric (GE) engine, there have with turbine glowing, to run at temperatures "greater, in excess of 1,600°F." GE is using the modified (HTE) engine as a furnace, but had at its Cranston, Ohio, plant to pour out its metal mold and dress blades. Turbine engine blades are 1,500°F, but turbine inlet temperatures are 2,000°F. High temperatures were achieved by pouring molten pot metal into modified combustion cans. In addition to the five hours in extra heat, there are hours in every additional cooling-up and introduction to standard (HTE) parts. Solid combustion blades were made by GE's Lane, Mass., large shop and the casting applied by its, Pittsburgh, Monroeville, Gas Turbine Division at Cranston. The testing is not complete. During the test, the HTE engine, which usually does not exceed 1,500°F turbine inlet temperatures, produced flames much higher than its rated 1,800-2,000 B. This was a byproduct of the test program, and an attempt was made to maximize thrust.

reaches and location during the transition period.

"Two years hence," Macdonald warned, "after the transition, weapons will be smaller and will not need extensive support bases. This will be subject to underground installation and waste disposal. No nation but aerial inspection can approach this situation, and conducting this as an accomplished fact, aerial inspection will face a problem of most great complexity."

"From a technological point of view, the time is right now—perhaps tonight and the tool is right for situation at the inspection task, public opinion must give cause to an aggressive search for peace."

Macdonald added that if inspection is to be effective, it will have to have a very rapid reaction time. Events at task, potential must be detected in weeks and months. Detection and communications systems must be available; however, that this country will not fall here to stand responsibility for

having started a war on false information.

In line with Macdonald's emphasis on communications in Open Skies, Dr. James B. Poff, Bell Telephone Laboratories, has been assigned the responsibility for designing a method of "rapid, continuous and reliable communications." He and his group from another task force under Stansky.

Too Late for Shockproof

Most fundamental consideration of international disarmament is location of hazardous materials and ICBMs in time and space. It is too late to keep track of stockpiled hazardous materials, but international inspection can begin in time to monitor development of means of delivery for these hazardous materials.

If the ICBM becomes operational, the greatest single need will be the technological breakthrough which permits detection of states of shielded fissile material. At present the information

from such a state can be easily screened from detection.

Thomas E. Myers, APC executive officer, said that the U. S. is doing all it can to achieve a breakthrough in detecting states of fissile materials.

Current methods have been suggested for keeping track of them, satellite-based or reconnaissance of the amount of new production. For example, aerial inspection following the methods found successful in geophysics in located mineral deposits could be turning to that geophysics area the more would be used both to be sensitive measures and theories. The greater the number of sensors and theories means located the greater the chance for the greatest inspection to check in the sensors stock-piled for military purposes.

Other inspection methods would be extensions of our present ability to detect U.S.S.R. nuclear bomb tests. However, there is some doubt as to the reliability of these methods. France

has told the U. N. that certain types of nuclear explosions, such as small ones or those under water, might not be detected because they do not create fallout.

First Steps

U. S. has proposed to Russia that the two nations carry out a small demonstration test of control and inspection, including ground posts and aerial reconnaissance.

This would be limited to a 20,000, 30,000 sq. mi. non-sensitive area in both the United States and the Soviet Union. The area would include at least one port, one airfield and one railroad terminal. Such a demonstration would give practical experience and would facilitate the negotiation of a disarmament agreement.

Earlier this year, the Soviets proposed before the U. N. that one of aerial photography be considered "within a wide area of Europe." In a depth of 800 kilometers (500 miles) to the East and West of the demonstration line between the principal armed forces of NATO and those of the Warsaw treaty countries.

Israel has asked why the U. N. should not try the world's first pilot scheme as the world's longest treaty, open—the Middle East.

U.S.S.R. Inspection

Little has been said about how Russia would go about inspecting the U. S. Using either the Soviet technique, known because of their very long range Bear helicopters, the Russians still would be forced to rely entirely upon what airfields the U. S. would make available to them. They lack the resources over very long for such a mission.

Stansky and that one of the Russian objection to aerial survey is that Russia

no does not want the U. S. to have a complete picture of the Soviet Union as Russia now has of the U. S., with no restricted areas marked on every road map. The Russians feel that greater inspection is enough, suggest that inspectors be stationed at fixed transport locations. In general, the Russians object that the United States wants too much inspection.

Soviet Deputy Ambassador (D. Mitya) believes the Soviet people are willing for two world they are able to

get their disarmament without ICBMs operational and controlled in underground sites.

In any event, Stansky has said that the result of his eight inspection study groups will be a detailed operating plan out of "what to inspect, how and where it would be inspected, and a knowledge of what can and cannot be profitably inspected if we seek to provide a safe guard against surprise attack and to preserve an international arms control treaty agreement."



T58s Tested in Sikorsky S-58

Specially modified Sikorsky S-58 for installation of two General Electric T58 turboshaft engines in a workshop in-down and initial flight tests at the Sikorsky plant in Bridgeport, Conn. S-58 has not been flown out of ground effect with two engines, out of the plant under. Lower flights may be attempted this week. In-flight camera picture against engine object camera (below). Both engines exhaust on left side. The two engines, which replace a Wright R1820-4 piston engine, deliver more than 2,000 hp; weight total of 550 lb.



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Field servicing and pre-flighting facilities and facilities require efficient air conditioning. To provide this air conditioning at ambient temperatures ranging from -55° to +125° F, American Electronic Model T and M-A-D air conditioning has a design load output rating of 60 pounds per cubic foot (60 cfm) cooling and 200° F air flow heating against static pressure up to 30 inches of water.

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USAF Contracts

Following is a list of unclassified contracts of \$15,000 and over as released by Air Force Contracting Office:

NAVIGATION AIR MATTERIES AREA
Wheeler AFB, W.
United Aircraft Corp., Glendale, Aircraft
for Refueling, 100,000, maintenance
of 10-11, 10-12, 10-13, 10-14, 10-15, 10-16, 10-17, 10-18, 10-19, 10-20, 10-21, 10-22, 10-23, 10-24, 10-25, 10-26, 10-27, 10-28, 10-29, 10-30, 10-31, 10-32, 10-33, 10-34, 10-35, 10-36, 10-37, 10-38, 10-39, 10-40, 10-41, 10-42, 10-43, 10-44, 10-45, 10-46, 10-47, 10-48, 10-49, 10-50, 10-51, 10-52, 10-53, 10-54, 10-55, 10-56, 10-57, 10-58, 10-59, 10-60, 10-61, 10-62, 10-63, 10-64, 10-65, 10-66, 10-67, 10-68, 10-69, 10-70, 10-71, 10-72, 10-73, 10-74, 10-75, 10-76, 10-77, 10-78, 10-79, 10-80, 10-81, 10-82, 10-83, 10-84, 10-85, 10-86, 10-87, 10-88, 10-89, 10-90, 10-91, 10-92, 10-93, 10-94, 10-95, 10-96, 10-97, 10-98, 10-99, 10-100, 10-101, 10-102, 10-103, 10-104, 10-105, 10-106, 10-107, 10-108, 10-109, 10-110, 10-111, 10-112, 10-113, 10-114, 10-115, 10-116, 10-117, 10-118, 10-119, 10-120, 10-121, 10-122, 10-123, 10-124, 10-125, 10-126, 10-127, 10-128, 10-129, 10-130, 10-131, 10-132, 10-133, 10-134, 10-135, 10-136, 10-137, 10-138, 10-139, 10-140, 10-141, 10-142, 10-143, 10-144, 10-145, 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Saab 32C For Reconnaissance

Latest version of Saab Lansen, the 32C, is a reconnaissance aircraft. Designed by Sweden as first, the airplane study is first flight recently at Saab Linköping, Sweden. The aircraft can be fitted with several different camera configurations, and has various equipment for night navigation and radar reconnaissance. Now it is modified slightly from earlier versions for the reconnaissance version of the Saab to meet all-weather weather aircraft study will replace a 32C photographic reconnaissance aircraft. When a 32C is incorporated in Swedish air force, all aircraft will then have been equipped entirely with jet aircraft. Detailed test before some significant studies.



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AIRCRAFT MANUFACTURE

PROBLEM	ANSWER	DESCRIPTION
ALUMINUM CLEANING		
All purpose aluminum cleaning	ALTRIX [®]	A scrubbing, tank tank aluminum cleaner for rapid removal of marking ink and soil from aluminum alloys.
Decarburizing aluminum prior to spot welding	2447	Room temperature decarburizer for removing oxide film and restoring correct resistance of aluminum alloys to proper welding requirements of less than 30 mhos/in.
Power washer	SPRAY-ALTRIX	An effective cleaner for aluminum and other metals, developed for use in spray washers.
MAGNESIUM CLEANING		
Heavy duty tank cleaning	W.L.B. [®]	A versatile, heavy-duty tank cleaner for removing heavy oils, greases and drawing compounds. Formulated to combine water-soluble for better cleaning action. No soap foam!
Alkaline cleaning	ALTRIX [®]	For cleaning aluminum and magnesium in the same tank. Eliminates soap foam in hard water. Removes most oil, drawing and shipping compounds.
STEEL CLEANING		
Heavy-duty tank cleaning	W.L.B. [®]	A versatile, heavy-duty cleaner for removing greases, oils, and drawing compounds. Close heat-treated, oil-treated steels.
Heavy-duty alkaline cleaning	P.S. [®]	For cleaning steel prior to plating, removing carbon steel when used with reverse current, cleaning magnesium, copper, brass, and non-ferrous.
SPRAY BOOTHS		
Water wash spray booths	FLUTE [®]	A new product for water-wash spray booths. Eliminates foaming and slaking paint sludge. Freshens drying and back wash tanks.

AIRCRAFT MODIFICATION AND MAINTENANCE

PROBLEM	ANSWER	DESCRIPTION
ALUMINUM BRIGHTENING		
Removing surface corrosion residues	1-2787-C	A medium duty brightener. Removes surface corrosion residues. Brightens without carrying residues. Meets Specification MIL-C-25378.
Rapid removal of finish and corrosion from aluminum	PRO-11 [®]	A fast remover and metal conditioner for rapid removal of finish and corrosion from aluminum. Also, for preparing aluminum, zinc, steel, and cast for painting.
CARBON REMOVAL		
Cold tank carbon removing	R-1078	A nonflammable cold tank carbon remover for grease, oil, carbon deposits from jet and piston engine parts. Noncorrosive—excellent for stripping paint from base metals.
AIRCRAFT EXTERIORS		
Exterior cleaning	AIRWASH 18-231	A water soluble alkaline cleaner for washing painted aircraft surfaces.
Emulsion cleaning	1208	An outstanding emulsion cleaner—meets Specification MIL-C-25379 A—oil and grease remover. Excellent for white paint.
EXHAUST STAINS		
Carbon removing	SPRAZZER [®]	A heavy-duty paint stripper—excellent for removal of heavy, colored and baked-on carbon in the exhaust area.
Removing exhaust stains	No. 30	For removal of exhaust stains. Prevents corrosion in exhaust/diesel areas. For tubular clean, use without diluting.
INTERNAL FUEL-TANK DRAINING		
Removing sealing compounds	No. 2787	For removing all types of sealing compounds. Especially effective in removing poly-ethylene gaskets.
Tank spotting	444-C	Apply by brush in spots or patches of rusting. Immerse in solvent. Rinse with water. Dry. Seal with paint and breather seal to normal, water removed daily.
PAINT REMOVAL		
Paint removing	SPRAZZER [®]	A heavy-duty, fast-acting, free-running stripper. Safe on aluminum, magnesium, steel, and other aircraft metals.
Paint removing	P-1875	Superior fast-type remover for aircraft finishes.
OIL AND WATER ABSORBENT		
Rust absorbent (absorbent)	ZORBAUL	The safest, lowest "oil cost," all purpose floor absorbent. Absorbs both oil and water without breaking down. Lasts longer, goes further.

See 2-3 for OI



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Newly revised government research and development contracting policies and procedures explained in detail.

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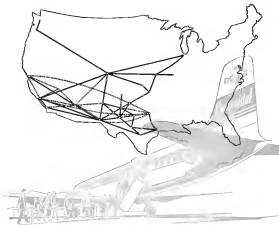
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COMBUSTION SYSTEMS • HEAT EXCHANGERS • PNEUMATIC CONTROLS



SAFETY

CAB Accident Investigation Report:

Pilot Filed VFR, Flew on Instruments

On April 9, 1956, Avon Commuter, model 130, serial 1207, N 5948N, filed and approved by Corlies Airlines departed Anchorage, Alaska, on a scheduled flight to Denver. It failed to reach its destination and a search resulted in discovery, the following day, of its wreckage on a mountain slope near Slabola Lake, Alaska. The pilot and five adult male passengers were killed and the aircraft was disintegrated.

HISTORY

Corlies Airlines Flight 6 of April 9, 1956, departed Anchorage International Airport at 0905 A. S. 1st scheduled time of departure, 0947, destination Denver. The flight plan filed with the company in Pilot John Wilbur White contained the following: Anchorage to Denver, VFR or Slabola Lake, time elapsed 141 knots, estimated time en route 41 minutes. All fuel tanks were full and the fuel was found to be sufficient for 50 minutes. The estimated time en route at Sea was 0950.

Witnesses near DEN filing southeast toward Denver heard it code Upper Rensselaire Lake and saw it pass through upper filing southeast at 0951. At 1051 Flight 6 was still unreported and search and rescue procedures were initiated. On April 10, 1956, at approximately 1400, the wreckage of 55N was reported on the north slope of an unnamed mountain east of Slabola Lake, at an elevation of approximately 5,000 feet, in a 10-15 mile triangle 40-24 N, longitude 151-57 W.

INVESTIGATION

The wreckage of 55N was located by a 10-man party who was working in the search and rescue efforts which had been initiated in the United States Air Force, from Denver, and 10.

One passenger, which was found, was seen in damaged condition, and a dismemberment of the time of the crash. Days up, to the aircraft crash site presented a true baffling. No other wreckage was found. However, it appears that the aircraft was forced at approximately 0951, then, minutes after the aircraft was last seen 15" miles southeast of the crash site.

Investigation disclosed that the flight proceeded from Anchorage toward Denver via Slabola Lake and Upper Rensselaire Lake. The wreckage of 55N and the Lake Slabola, who were located in a lodge on the north shore of Upper Rensselaire Lake, 10 miles southeast of the accident site, were as follows:

On Monday morning, April 9, 1956

Investigation returned to see 0100
 1010 flight 6000, was 10000 standard and based on the 24000-1000
 10000 flight 6000.
 10000 flight 6000, was 10000 standard and based on the 24000-1000
 10000 flight 6000.

while outside one cabin in a blinding March, clearing a ditch in the snow to keep nothing was, never from morning in one order, was the low engine Avon Commuter came out on the local group south toward Denver. It was identified as being that particular plane because it was a 10000 on the Corlies Airlines, was to Denver, and we had been discussing it with both pilots from those who had filed here the week before.

The crew was like and seemed back in the cockpit. We heard him say but could not see him in the driving snow and he was not seen on the local. At that time, witnesses were about 10000 yards.

We went out shortly at 1000 and he pushed the throttle a couple of times making it was to give us the highest.

Then he seemed to see the area and started to climb. We heard him about 15 seconds before the plane crashed. We heard that the fuel was on the local on the local. Also, it was a small one who had been on a search party for lost planes, indeed immediately at the crash which reported was 10000. We heard him say to be local, actually as we entered a local plane, which was the Alaska Commuter line.

Wreckage

A CAA investigator arrived the day after the wreckage from a helicopter on April 12 and April 13, 1956. 55N, which flew on a weekly heading had struck the western slope of the mountain and had come to rest approximately 200 yards from the point of first impact. The cockpit and cabin were badly damaged. Bodies of all occupants were found by military personnel. The wreckage was in a state of total disintegration and no trace of the aircraft was found. The wreckage was found in a state of total disintegration and no trace of the aircraft was found.

On Feb. 14 the board investigator was able to reach the site of the accident to determine the heading of the wreckage. The wreckage was found 100 yards from the point of first impact. At the time the wreckage was found, it was in a state of total disintegration and no trace of the aircraft was found. The wreckage was found in a state of total disintegration and no trace of the aircraft was found.

body of the wreckage, and the terrain confirmed the observation in our last report. The aircraft appeared to be a large at approximately 5,000 feet while on a heading of approximately 170 degrees magnetic.

Impact made made by the mountain. This was the only communication from Flight 6 after the VFR flight was made.

slight upon the aircraft were on the last or side of the wing at a point approximately 100 yards from the pilot's cockpit. The area where the aircraft was found, showed no trace of the wreckage. The cockpit and the passenger compartment of the wreckage were disintegrated to a point 100 yards from the point of first impact.

The aircraft had moved across the slope during a search for 20 yards, rebounded, and came to rest at a point about 100 yards to the east and about 100 yards from the point of first impact.

Both passengers were found in the wreckage. One of them was in the cockpit, the other was at a point about 150 yards to the east of the main wreckage and at an altitude of 2,500 feet. Neither passenger was injured.

Structure Collapsed

The cockpit section remained attached to the fuselage, but its structure had collapsed. It was found in a state of total disintegration and no trace of the aircraft was found. The wreckage was found in a state of total disintegration and no trace of the aircraft was found.

A line passing the damaged portion of the right wing to the damaged portion of the fuselage, Section had a disintegrated state at present. The time was that at the western slope in the direction along the path of the aircraft. The wreckage was found in a state of total disintegration and no trace of the aircraft was found.

The fuel tanks remained unexploded but possibly all of the fuel had leaked out through broken fuel lines.

The wreckage with the rear portion of the fuselage was separated from the main wreckage and was found in the lake. It was found in a state of total disintegration and no trace of the aircraft was found.

The wreckage was found in a state of total disintegration and no trace of the aircraft was found. The wreckage was found in a state of total disintegration and no trace of the aircraft was found. The wreckage was found in a state of total disintegration and no trace of the aircraft was found.

The CAA operating certificate AN 15 (CVR 42) issued to Corlies Airlines was suspended on April 10, 1956, and during the hours of daylight only. Despite of such action as the suspension of the pilot in charge, and does not require clearance from the company dispatcher.

However, on April 9 the weather conditions, which are described later, were such that pilot and dispatcher continued at length after which the dispatcher continued at length.

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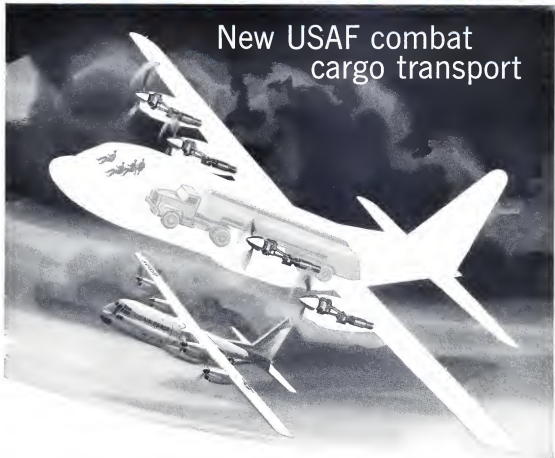
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